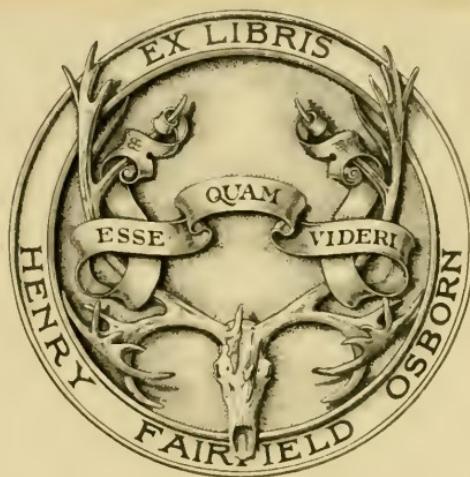


MORE
NATURAL HISTORY
ESSAYS

RENSHAW

FOR THE PEOPLE
FOR EDUCATION
FOR SCIENCE

LIBRARY
OF
THE AMERICAN MUSEUM
OF
NATURAL HISTORY



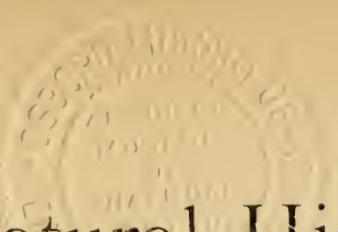
LIBRARY
OF
THE AMERICAN MUSEUM OF NATURAL HISTORY
OSBORN LIBRARY OF VERTEBRATE PALÆONTOLOGY
PRESENTED APRIL 16TH 1908

Prof. H. F. Osborn
with the authors
kind regards
Dec. 9. 1905

More Natural History
Essays



UNDER AFRICAN SKIES.



More Natural History Essays.

59 A. 08 G.
C

BY
GRAHAM RENSHAW, M.B., F.Z.S.

AUTHOR OF
“NATURAL HISTORY ESSAYS.”

ILLUSTRATED.

Sherratt & Hughes
65 Long Acre London W.
27 St Ann Street Manchester

1905

To my Mother

PREFACE.

THE kind reception accorded by both Press and public to my previous book of Natural History Essays has encouraged the preparation of the present work as a companion volume. Written on similar lines, it differs from its predecessor in treating of mammalian types selected from the fauna of the world rather than from that of Africa only, although examples of the latter also occupy a place in its pages.

GRAHAM RENSHAW.

BRIDGE HOUSE

SALE, MANCHESTER

October, 1905.

CONTENTS.

				PAGE
I.	THE SPECTRE TARSIER	...	...	1
II.	THE VAMPIRE BAT	...	...	11
III.	THE FLYING LEMUR...	...	...	21
✓ IV.	THE ELEPHANT SHREW	...	...	31
V.	THE CLOUDED TIGER	...	...	44
✓ VI.	THE HUNTING LEOPARD	...	...	65
VII.	THE ANTARCTIC WOLF	...	...	77
✓ VIII.	THE HYÆNA DOG	...	...	93
IX.	THE JAMAICA SEAL	...	...	108
X.	THE ADDAX ANTELOPE	...	...	119
✓ XI.	THE SABLE ANTELOPE	...	...	128
XII.	THE MALAY TAPIR	...	...	143
XIII.	THE NORTHERN SEA-COW	...	...	155
XIV.	THE WHITE WHALE	...	...	170
XV.	THE PRÉVOST SQUIRREL	...	...	183
XVI.	THE COMMON CHINCHILLA	...	...	191
XVII.	THE GREAT ANTEATER	...	...	198
XVIII.	THE HAIRY ARMADILLO	...	...	211
XIX.	THE TASMANIAN THYLACINE	...	...	216
XX.	THE TRUE ECHIDNA	...	...	233

LIST OF ILLUSTRATIONS.

					<i>Frontispiece.</i>	
					TO FACE PAGE	
UNDER AFRICAN SKIES	
BANANA TREES	1
THE HOME OF THE ELEPHANT SHREW					...	31
CLOUDED TIGER	44
HUNTING LEOPARDS SUNNING THEMSELVES					...	65
ADDAX IN SUMMER COAT	118
ADDAX IN WINTER COAT	120
SABLE ANTELOPE	128
SABLE ANTELOPE CALF	134
MALAY TAPIR	153
WHALE ROOM IN THE NATURAL HISTORY MUSEUM	172
COMMON CHINCHILLA	191
ANTEATERS	200
YOUNG ANTEATER	210
HAIRY ARMADILLO	212
TASMANIAN THYLACINE	216
TRUE ECHIDNA	233
DINGO	239

THE SPECTRE TARSIER



BANANA TREES.

THE SPECTRE TARSIER

Few save professional naturalists are really conversant with a tithe of the animals which are exhibited in museums and zoological gardens. So great is the number of species now known that taking the mammalia only, the tyro in zoological science has before him a new world to explore, while the advanced worker still possesses an inexhaustible mine. The nocturnal creatures, being from their very nature difficult to study, perhaps exhibit in greatest degree that element of mystery which forms so great a part of the composite, many-sided charm of this delightful Science: therefore, these Essays may well commence with an example selected from their ranks. The lemurs, with their great staring eyes and ghost-like movements, are indeed weirdly attractive, and some of the lesser species recall the quaint hobgoblins of fairy tales. Perhaps the most singular of all this singular host, the king of the goblins, is the little tarsier lemur of the Philippine Islands and the East Indies.

The spectre tarsier (*Tarsius spectrum*)—malmag of the Bohol natives—is about the size of a small rat, the length of the body being about six inches and that of the tail about eight. The head is rounded and catlike, with large erect ears. The eyes are enormous and staring, being so closely

approximated that the small pug nose seems almost crowded out of the face: in the dried skull the orbits are very wide and deep. The feeble jaws indicate a diet at least partly insectivorous; beneath the tongue is the small cartilaginous plate or sublingua which occurs in many lemurs, and is supposed by Professor Gegenbaur to correspond to the reptilian tongue. The fingers and toes are markedly elongated; they expand at the tips to flattened discs, which perhaps exercise a true suctorial action, like the adhesive pads of the myxopoda bat of Madagascar. Be this as it may, a stuffed tarsier in the Manchester Museum has the tips of the fingers concave underneath; one can well understand the value of such natural cupping-glasses to an arboreal animal like the present, whose life might depend on the tenacity of its grip. Some of the toe-nails are pointed and erect—not applied closely to the flesh as in ourselves. The innermost or “great” toe is flat; the middle ones are pointed and erect; while the remaining outer ones are again flat. The long tail is remarkable for being haired at root and tip, naked in the middle; it probably counterpoises the body in leaping. The foot exhibits a remarkable elongation of the *ankle* (a very rare feature in mammals), so that the animal is supported on a pair of natural stilts.

The length of the tarsier’s ankle is due to the increased size of the calcanear and navicular bones:

a structural modification found also in the galagoes and mouse lemurs, but *nowhere else amongst the mammalia*. In other groups of leaping animals the same end—lengthening of the limb—is attained by other means. Thus the jerboa rat of Algeria has the *metatarsal* bones (those immediately *below* the ankle) fused together into a single rod, as in birds. The first and fifth digits have actually disappeared, while the lower ends of the metatarsals (fusion not being quite complete) are provided with facets which articulate with the bones of the second, third, and fourth toes. The Cape leaping “hare” has both foot and toe bones elongated, but not those of the ankle. In the kangaroos both the lower leg and the foot (but again not the ankle) are lengthened. Curiously enough, the common frog of our English meadows has the ankle elongated in tarsier fashion¹: an amphibian, cold-blooded and aquatic, thus shares this character with a warm-blooded arboreal mammal. Doubtless the elongated bones not only increase the tarsier’s length of leap, but also by their elasticity modify the shock of alighting. In ourselves, at any rate, even the small bones and ligaments of the foot by their number and resilience effectually act as buffers: this may be readily demonstrated by allowing oneself to alight first on the heels (shock transmitted direct to calcaneum) and

¹ In the frog’s ankle, however, it is the caleaneum and the *astragalus* (not the navicular bone) which increases in length.

then on the toes (shock modified by bones and ligaments of digits and plantar arch).

A curious anatomical feature of the tarsier seems to have hitherto escaped the notice of naturalists. On examining the inside of the ear in a museum specimen one notices a number of transverse ridges situated on the upper part of the pinna. These probably indicate bundles of muscular fibres which in the allied galagoes are so powerful that the animal can actually fold up its ear as a sailor reefs a sail. A careful dissection of the human subject indicates that vestiges of these fibres exist also in man: they are limited to a few bundles of tissue—transverse muscle of anatomists—and are of no functional importance.

The colour of the tarsier varies. As a rule the general body hue is brownish fawn paling to yellowish grey below; a reddish tinge ornaments the forehead and cheeks, while a blackish ring round each orbit accentuates the weird expression of the eyes. Some individuals, however, are chestnut, others dusky brown. The Bancan tarsier, founded on a specimen obtained in the woods near the Jeboos tin mines by Dr. Horsfield in 1813-14 was, as pointed out by Temminck, only a young individual (yearling) of the *Tarsius spectrum*. Temminck presented to Cuvier a specimen of the tarsier preserved in alcohol; the mammal catalogue of the Paris Museum, published in 1851, mentions another

(male) specimen from the collection of the Stadtholder of Holland.

The tarsier was first so named by Buffon, in allusion to the elongation of the *tarsus* or ankle. He, however, compared it to the jerboa which, although leaping over the ground much as a tarsier might do, has the lower extremities constructed, as we have seen, on a totally different plan: the calcanear and navicular bones (especially the latter) of the jerboa are mere fragments. Pennant likewise styled the tarsier the "woolly gerboa." MM. Geoffroy St. Hilaire and Cuvier published a memoir on the tarsier in the *Magasin Encyclopédique* for 1795. In 1824 we find the tarsier figured in Dr. Horsfield's "Zoological Researches," the plate being drawn by William Daniell from a young specimen in the East India Company's museum and formerly the property of Sir Stamford Raffles. Apparently the artist contented himself with reproducing the likeness of the actual dried *specimen* before him, without endeavouring to "restore" its probable appearance during life. One finds this scrupulous over-exactness common in old works of natural history, since the drawings of the majority of the earlier artists seem to have been made directly from specimens mounted in the not very successful style of the ante-Victorian taxidermists. A tarsier preserved in spirits of wine was presented by Sir Stamford Raffles to the Zoological Society: it had been obtained in Sumatra,

and was long exhibited in the Bruton Street museum. Spirit specimens are only second in value to live ones; since all necessary measurements can be taken from them. Even the contour of the muscles (allowance being made for shrinking due to the action of the spirit) can be approximately deduced; but the weight of such examples is probably less than that of living ones, since the dehydrating action of the preservative causes the tissues to be poorer in the watery constituents which it necessarily extracts. In 1837 Mr. H. Cuming presented to the Zoological Society's museum a female tarsier and a young one not more than a few weeks (or perhaps days) old, so that the Society was well equipped for the study of these quaint lemurs. An excellent figure of the tarsier will be found in Cassell's Natural History (Second Edition). The animal is represented as standing semi-erect on the ground, with one hand outstretched to grasp a beetle crawling over a leaf. Both beetle and leaf give an approximate idea of the size of the tarsier: such valuable adjuncts are too often neglected by artists, who sometimes give no guide at all to the size of the animals they figure, woodenly drawing mouse and mammoth, rabbit and rorqual on the same scale! Mr. Cuming directed his specimen to be displayed in a standing position and inclined forward, as if about to spring. At the present day, good taxidermy and improved draughtsmanship have given us an excellent idea of the

spectre tarsier, and in the Manchester Museum there is a female example well mounted in the life-like attitude suggested by Cuming; while the Liverpool collection also includes a tarsier carefully set up in the same way. Dr. Guillemard in his "Cruise of the *Marchesa*" has figured one of these lemurs as creeping on all fours along a branch, with ears erect and tensely curved tail. This attitude is illustrated by the dark-coloured specimen in the Natural History Museum at South Kensington, though it has been set up much too stiffly and the tail and hind legs have been much distorted in mounting. The Leyden Museum possesses a magnificent series of tarsiers of all ages and both sexes—twenty in all of these rare lemurs, including nine preserved in alcohol; the Dutch naturalists seem to have ransacked the Archipelagoes for specimens. The series includes specimens from Banca (Teysmann collection, 1872), from the Kapouas River, S.E. Borneo (Schwaner), from Java (Neeb), from the island of Sanghi between Celebes and Mindanao (Hoedt) and from the island of Saleyer south of Celebes (Reinwardt).

So far museum specimens. Unfortunately, the tarsier has never been brought alive to England, and, although kept as a pet in its native country, is tamed chiefly by the Malays. Its nocturnal habits and acknowledged rarity militate greatly against any European naturalist making a prolonged study of it. The only observer who has been able to give a fairly

full account of the "malmag" seems to have been Mr. Cuming, who, in 1837, possessed one which had been taken in the woods of Jagna, in Bohol, one of the Philippine Islands. This specimen gave birth to a young one, and the mother and young were the two afterwards presented to the Zoological Society's museum. Mr. Cuming found the spectre tarsier to be very cleanly in its habits, never returning to half-eaten food nor even drinking a second time from the same water. It preferred a diet of lizards, but would also take shrimps and cockroaches, especially if they were alive: perhaps these were individual tastes, since the tarsier which the natives of Celebes brought to the yacht "*Marchesa*" refused to eat cockroaches at all and died on the third day. The tarsier is easily tamed, and then likes to be caressed, climbing about its owner's person and licking his hands and face. Usually silent, this animal, according to Mr. Cuming, occasionally utters a single sharp cry which is not repeated.

In the wild state the spectre tarsier spends nearly all the daytime asleep inside hollow trees or under the roots of bamboos. At night it is active, leaping from bough to bough in search of food. When eating it sits upright like a squirrel; when drinking it laps slowly like a cat, which animal it also resembles in frequently carrying its young in its mouth. These queer youngsters do not, however, require much maternal guidance, since at two days old they can

climb without aid. Usually there is only one at a birth, sometimes two. Tarsiers wander about in pairs like the galagoes, and it is said that when one of them is taken the capture of its mate may be confidently predicted in a very short time. In this connection it will be remembered that the bush baby or maholi galago—an allied African species—is often taken in pairs by the bushveld Boers.

The present species excellently exemplifies the uncertainty which attends the study of rare animals. In the first place its haunts are situated in a region of the globe—Malaysia—remote from scientific investigation. Secondly, it is nocturnal—hence less likely to be met with than a daylight species. Thirdly, it is of small size, therefore less conspicuous than a larger animal would be, and easily lost in the tangled brakes of the jungle. Fourthly, it is arboreal—difficult to find when asleep, or to capture when awake. Fifthly, it is rare even in the remote localities which it is known to inhabit; while some of the natives, instead of petting it like those animal-lovers, the Malays, regard it with superstitious dread. According to Professor Schlegel the Sumatrans believe that the tarsier—once the size of a lion—will cause misfortune to befall if it shows itself on a tree near their ricefields—"een ongeluk zal overkomen wanneer er zich een op een boom in de nabijheid von hunne rijsvelden vertoont." Although, of course, Europeans do not

share this feeling, they are but few as compared with the native population, hence less likely to meet with the tarsier. Lastly, even if interested in Zoology, few of these few Europeans are naturalists trained to minute observation and in the right methods of searching for and collecting specimens. One thus understands the rarity of this little lemur in most museums, and its total absence from European Zoos; perhaps one should rather wonder that so many skin-specimens have been obtained. Small marvel is it that even the professional dealers, who by means of agents abroad supply specimens for collections, are frequently unable to obtain examples of a specially-desired animal, even after persevering efforts. Bullock's famous museum took seventeen years to collect, and cost him £30,000. The Derby Museum at Liverpool was the fruits of sixty years' patient harvesting. Our own National Collection is the "long result of time," so also that of the Jardin des Plantes, the Senckenberg Museum at Frankfort; so indeed with all. The little tarsier is one of the most interesting of museum *desiderata*, for its aberrant structure and quaint appearance rank it high amongst nature's curiosities. Staring eyes, elfin face, stilted ankles, sweeping tail; it would be difficult to find a more extraordinary little creature, whether in or out of a story-book.

THE VAMPIRE BAT.

“Like the bat of Indian brakes
His pinions fan the wounds he makes,
And soothing thus the sufferer’s pain
He draws the life blood from the vein.”

Lines quoted by an M.P. (? Mr. T. P. O’Connor) in the House of Commons, March 15, 1905.

The well known motto *in omnia paratus* receives frequent illustration amongst animals: they are armed at all points for the battle of life. The musk ox of Greenland carries a pair of stout horns for defence and is clothed in a thick overcoat of wool and hair, while its broad hoofs carry it safely over the frozen snow. The European mole, clad in a pliable suit of natural velvet, easily traverses its underground galleries and performs wonderful feats of engineering with its spade-like hands. The untidy tree porcupine of Canada climbs well and easily, aided by its prehensile tail, while its uncouth outlines protect it by simulating, when high up in the branches, a ragged last year’s bird’s nest. The porpoise hunts the teeming herring of the North sea, its mammalian intelligence and fish-like body rendering it more than a match for them as the trap-like jaws open and shut amongst their silvery myriads. One may regard carnivorous animals of all classes—mammal, bird, reptile—as highly organised machines, modified in every way for assimilating animal food; amongst

these forms one may also reckon a few which habitually subsist on fluid nutriment, and indeed are so specially adapted for this diet that they starve if they cannot obtain it. Truth is stranger than fiction; such remarkable beings are found even amongst the mammalia. They live entirely on fresh-drawn blood, and are known as vampire bats. Two species of true vampire are known: the vampire *par excellence* being the larger of the two and inhabiting Central and part of South America.

The vampire bat (*Desmodus rufus*) measures but three inches in length (head and body) and two and a half in length of forearm: it is thus by no means the terrible monster which one would have supposed, being but little larger than the noctule bat of the British Islands. The muzzle is short, conical, and surmounted by a small leaf of specialised skin. The fur of the back is thick and somewhat long. The wings are quite transparent anteriorly, more opaque in their posterior two-thirds. A well-developed opaque patagium unites the forearm with the shoulder. There is no tail and no spur on the ankle to support the interfemoral membrane, which is very short. The colour of this bat is reddish brown (often tinged with ashy grey) above, yellowish brown below; it is readily distinguished from its smaller congener by its superior size and by the *total* absence of the ankle-spur. Thus the desmodus is not at all remarkable in appearance; many harmless

species present a far more forbidding exterior. The mastiff muzzle of the molossus bat, the distorted head of the tomb bat, or the bare puckered skin of the naked bat, are far more repulsive and hideous. Harmless species indeed are often remarkable by reason of the nose- or chin-leaves on their faces. These tags of skin are supposed to exert a tactile function, like the whiskers of a cat : in the flower-nosed bat of the Solomon Islands they attain the acme of development, the face of this singular creature being masked by a rosette of crumpled skin which extends upwards as far as the eyes. Contrasted with these strange creatures the vampire seems a commonplace and almost homely little beast. *Cucullus non facit monachum.*

The internal structure of *Desmodus rufus* amply atones in interest for the dull exterior which would cause many to pass it by unheeded. To begin with, the teeth are highly specialised for the purpose of bloodletting. Molars are useless to an animal which never chews, hence they are but rudimentary in the lesser vampire and absent in the desmodus. On the other hand this nocturnal surgeon requires a lancet for cutting the skin; hence the upper incisor teeth are reduced in number, increased in size, and sharp-edged like chisels. The canine or eye teeth are large and sharply-pointed, and even the rudimentary premolars are trenchant, working against each other. When the mouth is closed the

sharp edges of the upper incisors fit neatly into a hollow in the lower jaw, just as the blade of a penknife sinks into its sheath. The mouth of the vampire is a veritable case of surgical instruments, keen-edged if not aseptic. As regards the mode of action, it has been established that the bat rasps the skin rather than bites it, and thus planes off a minute shaving and causes the blood to ooze from the capillaries. It has also been thought that the animal uses the sharp canines as augers, boring gradually deeper as it flutters round and round; but this requires confirmation. The toes and nose in man and the withers and haunches in cattle appear to be the usual points of attack.

A remarkable statement as regards the vampire, namely, that it is difficult to stop the bleeding set up by it, offers an opening to any naturalist keen on original research. Mere capillary oozing can usually be arrested by firm pressure on the part; hence perhaps there is some haemolytic constituent in the bat's saliva which prevents the formation of a clot. At any rate the pharynx of the leech formerly used in medicine contains such an agent, which can be extracted by chemical means, and even as a pharmaceutical preparation will effectually hinder the coagulation of fresh-drawn blood placed in a test-tube. That such a constituent should exist is reasonable enough, for it is of the utmost importance to the bat that its food should be absolutely fluid; its

gullet is of so small a bore (barely admitting a stout bristle) that it would probably be unable to swallow even minute clots. The stomach moreover is of the simplest construction; instead of being subglobular as in ordinary bats it is long and narrow, like a loop of the intestine with which it is directly continuous. A specimen of the true vampire, beautifully dissected to show these details, is now preserved in the Royal College of Surgeons' Museum.

The vampire bat became known to Europeans unpleasantly soon after the conquest of South America. Peter Martyr mentions their attacks on men and cattle in the Isthmus of Darien. Condamine in the eighteenth century noted their destructiveness, which entirely frustrated the efforts of the missionaries to introduce cattle amongst the natives; while according to Sir R. Schomburgh, the natives of Wicki were unable to keep fowls, which the bats destroyed by attacking their combs.

Especially abundant in the valley of the Amazon, the vampire spends the daytime in holes and hollows of trees, issuing forth at twilight to search for victims.¹ So plentiful are (or were) these bloodsuckers that they constitute, as in the days of Condamine, a real

¹ Bats when hanging suspended in the daytime are very interesting to watch. Some African fruit bats (*Cynopterus collaris*), recently studied by the writer, hung in a cluster of six from the roof of their cage, swaying gently like a bundle of withered leaves, with occasional movements of heads and ears. Each individual would from time to time stretch a wing, shaking it like a young bird with a rapid shivering movement. They cleaned their wings by passing the edges through their jaws and would also lick each other's fur.

danger to the stock of horse- and cattle-owners ; for though each bat take but a few ounces, repeated attacks by the besiegers rapidly weaken the unfortunate animals. According to Mr. Wallace, about 7,000 cattle were said to have been destroyed by bats in six months on the island of Mexicana, the myriads of *desmodus* reducing some of them to a most miserable condition. The bats were accordingly shot in great numbers; they may also be trapped by using a live dog as bait. Dr. Tschudi kept his mule free from them by smearing it with an ointment composed of camphor, petroleum and soap; bats do not like the smell of this unguent, which is hence largely used to deter them. Save for this blood-sucking propensity, the vampire is interesting enough. The swarms which at sunset flit through the woods and darkened fields should possess considerable attraction for the naturalist. The writer remembers watching with pleasure some years ago the evolutions of a number of harmless Old World bats as they flew silhouetted in black against the clear sky of Africa; and in the study of these animals much yet remains to be done.

The very abundance of the South American cheiroptera long hindered the recognition of the *desmodus* as the true bloodsucking vampire. Various harmless species have been accused of this eerie propensity. Even so accomplished a naturalist as Charles Waterton, who made several journeys into

the wilds of Brazil, erroneously supposed the short nosed artibeus to be the culprit. This bat certainly has a conical muzzle and is tailless; but it has a broader face than the true desmodus, and its dentition is not so highly specialised. Then again the soricine bat (*Glossophaga soricina*) was supposed to be addicted to bloodletting, the roughened tongue being regarded as the instrument of attack. It was found, however, that this bat uses the tongue to scoop out the pulp of fruit and not to rasp the human skin; hence the term "soricine bloodsucker" applied to it by the late Dr. J. E. Gray is quite unsuitable. Another suspected species was the javelin bat or fer-de-lance¹ (*Phyllostoma hastatum*): Mr. Bates, who caught one in Brazil, supposed this animal to be sanguinivorous, but a dissection of a spirit specimen will demonstrate that it does not possess the modified alimentary canal that is associated with such a diet. Lastly, the spectre vampire (*Vampyrus spectrum*) has been asserted to live on blood; an examination of its teeth will promptly settle the question. Mr. Bates, who opened the stomachs of several spectre vampires, found them full of fruit-pulp and seeds, and was thus able to clear up a little of this natural history tangle. All the above species are, however, technically classed as vampires, though they may not

¹ Not to be confused with the Jamaican fer-de-lance, a venomous though useful serpent which preys on the rats infesting the sugar canes. The phyllostoma is of conspicuous size, and its large body would quite fill the hand.

live on blood. One thus notes a curious paradox—there are harmless vampires, just as there are flightless birds, and fishes which, like the African *Periophthalmus*, habitually leave the water for the shore. It should nevertheless be borne in mind that of the very numerous bats classed as vampires a few species may occasionally vary their diet with blood: normally, however, their food consists of fruit or of insects taken on the wing. Insectivorous bats have a well-developed steering membrane uniting the tail and hindlegs into a kind of kite-rudder; the true *desmodus*, it will be remembered, has no tail at all and scarcely any interfemoral membrane.

In spite of its abundance no example of the true vampire seems to have been brought alive to England. There would appear to be little difficulty in doing this, provided that the bats were accompanied *en route* by living animals capable of acting as hosts. The South American cattle trade would doubtless admit of this, and the bats would certainly be an interesting addition to the Zoological Gardens.¹ For another reason also, the arrival of a boxful of these *desmodus* would be very acceptable to English naturalists; for it would then be possible to carefully and methodically search the salivary glands for any ferment that might hinder the coagulation of blood.

¹ Since the vampire ranges to the very seashore fine healthy specimens might be obtained by travellers on the very point of departure for England. A specimen was taken in 1847 at Valparaiso and another in the Baie de Piseadoros, Peru, on November 16, 1867.

The alleged difficulty of stopping the bleeding caused by this bat would be amply explained by the discovery of such an agent.

This research might be conducted as follows. The salivary glands of several recently killed vampires having been removed, minced, and pounded up in a small mortar, the crushed fragments might be digested with cold water or treated with a 2% aqueous solution of sodium bicarbonate. The extract thus obtained could then be tried on rats or guinea pigs, or indeed on the experimenter's own finger! Probably the first method would be as successful as any, since the extract obtained from the pharynx of the leech (probably secreted by the buccal epithelium) can readily be obtained by digesting in water; it acts powerfully though not permanently on the blood of dogs and rabbits, producing constitutional symptoms, and is eliminated by the kidneys. Leech extract has not yet been obtained in isolated form, though it is soluble not only in water but also in saline solutions. Alcohol, ether, and chloroform all fail, however, to dissolve it. Then, again, snake venom and even the poisonous substance in eels' blood prevent the formation of clots.

As regards the second method, one must remember that tryptic pancreas ferment dissolved in glycerine will, when injected into the blood of an animal, afterwards prevent the coagulation of the

shed blood. Peptone also (or the albumoses adhering to it) injected into the blood-stream (.5 gram per kilo according to Schmidt Mülheim) will prevent clotting in dogs, but not in rabbits, a substance being formed in the plasma, and many of the white blood corpuscles being dissolved. Now when one recollects that histologically the pancreas is but an immense salivary gland, the probability of the vampire saliva containing a haemolytic agent is distinctly increased; for it may contain a body analogous to the tryptic ferment of the pancreas already mentioned. This research is of considerable academic interest, and perhaps also of practical value, since it may be possible to discover some improved method of dealing with the bites of vampires. In this connection it is well to remember how Science by attacking the apparently insignificant mosquito has lessened the ravages of malaria, and how the recent study of the tse tse fly (itself a bane to cattle) has been the key to the study of the sleeping sickness of Uganda. The lower animals deserve serious attention, from the indirect influence they may exercise upon man. The plague-stricken rat, the oyster which spreads typhoid, and the blowfly that transmits blood-poisoning cannot with impunity be left out of account; hence it may be far from unprofitable for some experienced naturalist to prosecute with skilled enthusiasm the study of the brown harpy of the Amazon forests—the vampire bat.

THE FLYING LEMUR.

The coloration of certain predaceous mammals probably benefits them by rendering them inconspicuous; they are thus able with greater facility to ambush their prey. The facial markings of tiger-cats and paradoxures doubtless serve to (literally) mask their stealthy advance upon their victims. The reddish coat of the Sumatran bush-dog renders it inconspicuous in the twilight thicket. The white fox steals unheeded upon the lemming in the Arctic snow. Conversely, the colours of their victims are a set off to these advantages; animals which are preyed upon by others possess in their tints and markings a valuable system of life insurance. The stone-coloured bharal sheep, high in the alpine glens of Sikkim, is protected by its slate-grey coat from the pursuit of the snow leopard, itself gray-robed and inconspicuous. The red hartebeest antelopes pasture in gallant array amid giant anthills compacted of red earth. The dull-witted sloth hangs from the branches of the giant cecropia, being not only invisible from its dun colour but exhibiting between the shoulders an orange-tinted patch which

simulates the stump of a broken branch. Then again the cobegoes or flying lemurs of the East Indies and Philippine Islands are another instance of colour-protection.

The common cobego or flying lemur (*Galeopithecus volans*)—also called colugo and kaguan—is about the size of a cat and measures twenty-five inches in total length, the head and body together taping sixteen inches. A specimen now before me has the head small and pointed, with small eyes and ears, and a few slender whiskers about the muzzle. The incisor teeth are most remarkable, being compressed from before backwards and expanded laterally; those in the lower jaw are so deeply cusped as to be comb-like, and have very narrow bases. The outer upper incisors are *double rooted*—a curious circumstance unique amongst mammals—while under the tongue is a rudiment of the lemurine sublingua briefly noticed when describing the spectre tarsier. The cobego is further noteworthy in the possession of a well-developed fold of skin, which unites the fore and hind limbs and can be expanded like the parachute of a flying squirrel. A well-marked patagium, partly cutaneous, partly muscular, connects the fore-limb with the neck, while even the fingers and toes are webbed for three-quarters their length. The tail is encased in a well-developed steering membrane. Such an extraordinary being, half bat, half lemur, seems a survival of antediluvian times when

earth and air were alive with crawling ramphorynchi and gliding pterodactyls.¹

The coloration of the flying lemur is admirably adapted to harmonise with the bark of the tree to which it clings. The ground tint is of two types, grey and olive brown; it will probably be found that the lighter-coloured individuals frequent drier situations than their fellows. Various irregular spots and dashes of white are scattered over the beautiful soft fur, especially on the outsides of the limbs and on the lateral parachute. These not only smarten up the animal's appearance but also simulate spots of mould or mildew. The general hue of the cobego's coat quite suggests a piece of bark more or less spotted with fungi or flecked with lichen; my own specimen has a handsome triangular patch of white on the forehead with the apex of the triangle towards the nose. The under parts are pinkish. The spots on the fur tend to disappear with age. Museum specimens have the ears and palms black-brown, but in living cobego they are said to be pink. Mr. Waterhouse in 1839 separated the *Galeopithecus philippinensis* from its better known congener by reason of its narrower head, longer ears, and broader muzzle; but although two species of flying lemur have been recognised for the purposes of this book

¹ Ramphorynchi and pterodactyls were Oolite lizards capable of spurious flight like the little tree-dragons found to-day in Java. A young cobego with its curious head, naked skin, and parachute vividly recalls the pterodactyl as restored by geologists. The late Edward Newman even suggested that pterodactyls were of mammalian not reptilian nature!

they will be considered as geographical races of the same animal, thus following the arrangement of the Leyden Museum.¹

These creatures, then, are of nocturnal habit; they pass the daytime asleep, suspended from a lofty bough with all four feet together, and in this strange topsy-turvy attitude much resemble a large fruit. They have also been observed clinging motionless hour after hour to tree trunks. Cobego are said in Java to frequent isolated hills with an abundant growth of young trees; in the Malay peninsula they similarly live in the densest and most inaccessible jungles. At night the flying lemur becomes lively, running up the tree trunks and continually stopping with a jerk; probably this is to baffle any possible enemy, since by such abrupt pauses the cobego, mottled and silent, would seem to have vanished into the substance of the tree!² In addition to these gymnastics, the flying lemur leaps fearlessly from considerable heights, and, buoyed up by its expanded membranes, may sail obliquely for some hundred yards before it reaches another tree. The tail probably acts as a rudder and may modify the shock

¹ This institution is remarkable for its rich series of cobego, consisting of twenty mounted specimens and nine preserved in alcohol. The skeleton of a female obtained from Java in 1864 is also in the collection. It seems after all doubtful whether there is more than one species of flying lemur, the Dutch naturalists, with their abundant material, making no distinction, while a skull received by the Royal College of Surgeons, per Mr. Canning, from the Philippines, was actually referred to the *common* species by the late Sir W. H. Flower.

² The writer has noticed that the Indian palm squirrel makes similar stoppages when running over a floor.

of alighting. These animals carry their young with them, clinging to the fur of the mother. Young cobego (two only are born at a time) are blind, naked and wrinkled, recalling the half-finished appearance of a young kangaroo; their parachutes and skinny heads also remind one of the hammer-headed bat of West Africa. When at rest the female clings upside down in the usual fashion, supporting her infant in a kind of pouch formed by the incurved tail and its attached membrane. The tail is said to have prehensile powers, a statement to be borne in mind by those naturalists who follow Blyth and assert that Asia possesses but *one* arboreal placental mammal with a prehensile tail—the binturong or bear cat.¹

The cobego was the *felis volans terneata* of Seba, who published his museum catalogue in 1734-65. Pallas in 1780 (Proceedings of the Academy of Sciences of St. Petersburg) also mentions the galeopithecus. A specimen of the “flying colugo *Galeopithecus volans*, extremely rare” fetched £1. 1s. as lot 49 (second series) at the sale of Sir Ashton Lever’s museum (May-July, 1806); while Javan examples (now in the National Collection) were obtained by Dr. Horsfield, who used this species amongst others for his classical experiments on the

¹ Colonel Tickell, the well-known Indian naturalist, has left a drawing which represents a cobego just leaving a tree. The tail is markedly flexed.

upas poison.¹ A few words may here be devoted to the upas tree, so indispensable to poets and orators.

Owing to the exaggerations alleged to have been published by Foersch, a Dutch surgeon, in 1783, the upas tree (*Upas Antiar*) was formerly credited with most deadly properties. It was supposed to exhale a deadly vapour that killed every living thing in its neighbourhood; the valley where it flourished being a veritable cemetery of animals slain by the emanations of the tree. No bird could roost in its branches: the collection of the sap was a task only fit for condemned criminals who by undertaking it escaped further punishment. With a view to investigating these stories Horsfield made seventeen experiments on animals, including six on the cobego. The poison, made into a thin paste with water, was dried and inserted on a bamboo dart into a wound simultaneously made. Sometimes the fresh sap was used instead of the paste. Laborious respiration, dizziness, drowsiness, feeble pulse, and spasms of the abdominal and pectoral muscles resulted; the action of the upas poison is thus similar to that of the nux vomica plant from which strychnine is prepared. Unless actually absorbed into the system the upas poison is no more dangerous than any other vegetable solution; Dr. Horsfield showed that

¹ "An Essay on the oopas or poison tree of Java," *Asiatic Journal*, vols. i. and ii., 1813.

birds roosted safely in its branches, and that even the sap required boiling before it exerted its full effect. The deadly valley of Java, famed for its fatal results on animals, owed its lethal action, not to the upas which grew in it, but to the exhalations of carbonic acid gas that escaped from the soil. Nay, more, there can be little doubt that the upas poison might, as a pharmaceutical preparation, be beneficially employed in medicine ; witness the allied *nux vomica*, which as the official *Tinctura Nucis Vomicæ* or the equally well-known *Liquor Strychninæ Hydrochloratis* is to be found in every chemist's shop. The poet Darwin's lines :—

Alone in silence on the blasted heath
Fell Upas stands, the hydra tree of death,

only serve to perpetuate the absurd fable of Foersch. To the flying lemur, then, science owes a debt, the individuals martyred by Horsfield having together with the other animals employed conclusively demonstrated the physiological action of this famous poison.

Although the cobego has been known for a very long time to Europeans, and is relatively abundant near that great wild beast mart, Singapore, no living specimen has yet been brought to England. Easily taken in nets or captured by cutting down the tree, this meek creature may be seized with the hand and has never been known to bite ; it will eat plantains

and cocoanut leaves, nibbling the latter into bits and possibly straining out the coarser fibres between its comb-like incisors. It is said to be a delicate beast liable to take cold; but so is the slender loris of Ceylon, which is imported every year. It is therefore to be hoped that a living cobego will some day be safely landed in England, a task which might be successfully accomplished under intelligent care, reinforced by a plentiful supply of bananas or of young cocoanuts which would ripen *en route*. To see a flying lemur hang suspended in its natural fur cloak, to see it run up a branch, and to hear it quack like a duck, would be as great an attraction as a live gorilla, porpoise, or musk ox, and would rival in interest any of the numerous zoological treasures which have been exhibited during the long life of the Regent's Park Gardens.¹

In the meantime, stuffed specimens of the cobego may be studied in the various museums. A well-modelled example of the grey variety, mounted as if clinging to a tree trunk, may be seen in the National Collection. The pose of the bird-like head and cat-like body seem to leave nothing to be desired, and on studying this specimen one can well understand the advantages of protective coloration to a defenceless species like the present. Professor Schlegel in his "Dierentuin van het Koninklijk

¹ One could not guarantee that it would *fly*, though in a roomy apartment; even bats in captivity are very indolent in this respect, since it is no longer needful for them to hunt for food.

Zoologisch Genootschap Natura Artis Magistra Amsterdam" has published an excellent woodcut of the "vliegende maki." The animal in its mottled cloak seems to be just rousing from slumber and is slowly climbing, still upside down, along a slender branch. The artist having made the most of the scanty vibrissæ has given rather a rat-like appearance to the head; the webbed membranous feet are excellently rendered. Dr. Horsfield's specimens, at first located in the East India Company's Museum in Leadenhall Street, were afterwards transferred to the National Collection; other examples are now in the Derby Museum at Liverpool and in the Manchester Museum, Owens College. An interesting specimen—a young cobego preserved in spirit—was presented many years ago to the Zoological Society by Mr. J. C. Hoffman, and is perhaps identical with that now in the Royal College of Surgeons' Museum. This last-named example (recently examined by the writer) is now of a grey colour all over, naked, and with the parachute very wrinkled, while the head is much elongated, narrowing down to a blunt muzzle. This ugly duckling may be compared with the handsome adult specimen, brilliantly tinged with orange like a flying squirrel, which is preserved in spirit close by; the great contrast between them reminds one of the fish-like tadpole and the air-breathing frog, of the fat green caterpillar and the soaring emperor butterfly. One

is grotesque, pseudo-reptilian, almost unearthly ; the other is an attractive and indeed beautiful animal. Perhaps, however, the orange tint in the fur of the adult is due to the prolonged action of the spirit; just as museum specimens of the lime hawk moth become reddish after a time.

In taking leave of the flying lemur one is again reminded of the usefulness (or otherwise) of the lower animals to man, as pointed out in the essay on the vampire bat ; by this, is not, of course, meant *domestic* animals, whose value is undoubted. The rare and little-known cobego has yielded its contribution to scientific progress in the matter of the upas juice, just as in the hands of Charles Waterton the Brazilian sloth demonstrated the effects of the curare poison used in Indian blowpipes. The study of zoology offers a boundless field to the patient worker, and a thousand paths await his feet.

Arduus ad solem !



THE HOME OF THE ELEPHANT SHREW.

THE ELEPHANT SHREW.

Late in the afternoon of June 20th, 1903, the writer stood on the dismantled ruins of the old Turkish fort at Biskra. Far away on either hand stretched the African desert, a sullen expanse, dim grey to the interminable horizon. Leagues of rolling sand dunes, masses of rugged purplish rocks, chains of salt water marshes lay afar in the darkening wilderness : it was a country of savage desolation and utterly wild, yet possessing in spite of all drawbacks a romantic charm of its own.

Although prosecuted under considerable difficulties, scientific research in the Sahara has yielded many interesting trophies to the labours of the naturalist. Amongst larger game may be mentioned the addax antelope, the bubaline hartebeest, and the northern ostrich: amongst lesser quarry, bustards and gazelles. A host of small creatures also flourish in these remote wildernesses. Jerboa rats, long-legged and nimble, course in dozens over the arid plains; gerbilles—graceful counterparts of the jerboas—harbour in the sand or hop over its surface like tiny kangaroos. The ugly dabb or uromastix lizard, with a head like a tortoise and a tail like a flattened file, haunts the dunes; the hout el erdth or skink glides—a flash of bronze—through the noon-day sand. The hot springs of Biskra shelter

cyprinodon fishes, and the oases of M'zab are a refuge for the grey palm rat. Few denizens of the Sahara, however, are more remarkable than the jumping or elephant shrew.

✓ The Algerian elephant shrew (*Macroscelides rozeti*)—*far el keil* of the Arabs, *rat à trompe* of the French colonists—is about the size of a small rat. Large-eyed and large-eared, it is remarkable for its long legs and tail, which cause it to superficially resemble the jerboa of the same regions; the tawny colour of the fur in both animals is also noteworthy. An examination of the teeth, however, soon demonstrates that there is no true relationship between the two. The incisors of the shrew—red on the anterior surface—are pointed and hence suitable for seizing forceps-like small active prey, such as insects; those of the jerboa are true rodent shape, squared like a chisel and fitted for gnawing or rasping vegetable substances. The most remarkable feature of the elephant shrew is the strange elongation of the snout into an actual proboscis, flexible like the trunk of a tapir and bearing the nostrils at the end. This trunk is probably a tactile organ, since the long hairs or *vibrissae* are well developed near the tip; it is used for rooting in the sand, and is possibly prehensile.

The strange parallelism between shrew and jerboa—not *relationship* as we have just seen—has, doubtless, been produced by a similarity of environ-

ment. Both are inhabitants of the Sahara, a happy hunting ground for predaceous birds and venomous snakes and scorpions. Large eyes and ears are in both cases necessary for a nocturnal animal which in the obscurity of night must ever be on the alert to recognise food or to ward off danger. Length of limb conduces to speed—hence safety by flight—while the tawny coloration confers invisibility by harmonising with the sand and stones of the desert. The trunk of the shrew is, of course, a special development not paralleled by the jerboa.

It seems possible that this strange outward resemblance, whether one class it as an instance of true mimicry or not, may benefit one if not both of the parties concerned. Jerboas are relatively abundant (being frequently imported into England as pets); the elephant shrew is very scarce and local even in the localities which it inhabits. Hence if the shrews are less fleet than the jerboas they might escape detection amongst their swarming rodent companions, and a half-hearted pursuer mistaking a slow-footed macroscelides for a nimble jerboa might prematurely abandon the chase. This suggestion gains weight from the fact that other instances of insectivores mimicking rodents are known. The Asiatic tupaias or tree shrews simulate squirrels in their rodent-like attitudes and bushy tails; doubtless it is advantageous to them to be mistaken for such active animals as squirrels.

Were it not for the rarity of the jumping shrews one might suggest that the resemblance conversely benefits the jerboas also; for like many insectivores the macroscelides exhales a musky odour which may render it distasteful to its enemies. A young hawk or owl that had in its inexperience seized a nauseous shrew might afterwards (having once learnt a lesson) unwittingly spare a toothsome jerboa. One cites in support of this theory the reversed mimicry of insectivore by rodent seen in the tupaia-like squirrels of Burmah, Borneo, and Sumatra.¹ Such analogies must not, however, be pressed too far. In cases of undoubted mimicry it is always the *mimicked* species which is abundant, which would *not* be the case with a jerboa copying a shrew. Besides, the musky odour of the common English shrew "mouse" does not prevent it from being killed by dogs and cats.

Sparingly distributed throughout North-Western Africa, the elephant shrew is nowhere common. M. Parzudaki's collection contained two examples taken in Oran and afterwards acquired by the British Museum. Canon Tristram in 1860 recorded it from

1 On the same day (February 8th, 1875) there arrived at the London Zoological Gardens two curious animals, both new to the collection. They were a tree shrew (*Tupaia pequana*) presented by the Hon. Ashley Eden, C.S.I., of Rangoon, British Burmah, and a Blandford's squirrel (*Sciurus blandfordi*) presented by Mrs. Dunn. These were placed in the same cage, the squirrel exhibiting a marvellous resemblance to the tupaia. Perhaps this was a case of true mimicry. The tree shrew was believed to be the first tupaia of any species to reach Europe alive. Another instance of mimicry is seen in Everett's squirrel (*Sciurus everetti*), of Borneo, which resembles the mountain tupaia (*T. montana*).

the plain of Aïn el Ibel in Algeria. In 1881, a specimen taken on Mont Santa Cruz, near Oran, was presented to the Paris Museum by M. Bolivar. It also occurs in the alfa grass district of Aïn Oussera; at Djelfa; at Bou Säada; at Laghouat; and even near Algiers. Dr. Rüpell obtained an adult specimen in Abyssinia; my own were taken in Morocco. Living in barren stony districts, these little creatures hide away in the daytime in holes and burrows, perhaps sunk perpendicularly for a certain depth like those of the jumping shrew of Cape Colony. At night the macroscelides hunt for beetles in the sand, probing diligently with their tiny trunks; less particular than many of their congeners, they will also eat seeds. The Algerian shrew usually occurs in pairs, and there are but two young ones in a litter; the musky odour above mentioned probably prevents straggling. When alarmed, these animals bound away at a rapid pace in kangaroo fashion. Owing to their elongated snouts they resemble opossums or bandicoots; hence the marsupial appearance is heightened. Especially does the macroscelides recall the short-nosed bandicoot (*Perameles obesula*) of Australia, which again is itself superficially rat-like. These bandicoots have long muzzles with very small mouths, and longish ears; the fur is brown or greyish brown, and they often stand up on their hind legs. The head is the chief point of resemblance between the two, though ✓

the bandicoots being true marsupials have no real affinity with the Algerian shrew.

The nocturnal habits of the macroscelides expose it to the attacks of predaceous reptiles. A deadly enemy to small mammalia—the cerastes viper—haunts the African desert. This brute is about two feet long, of a uniform yellow colour or else marked with some thirty or forty dark brown spots. The head is broad, flat, and swollen by the lateral bulging of a pair of glands which secrete a poison deadly to small animals and fatal even to man. Some cerastes have a short curved horn situated above each eye; others are hornless. Dr. Anderson, who studied these reptiles some years ago in Egypt, obtained both horned and hornless cerastes of both sexes yet the same species, so that this remarkable variation is puzzling to account for. The cerastes lie almost hidden in the sand, which they heap upon their bodies by a lateral scooping movement; thus little save the top of the head remains exposed. They are also practically invisible from their coloration, which harmonises with that of the sand. Happily their sluggish disposition renders them unwilling to bite when discovered; yet one can well appreciate the cool courage of the professional snake hunters, who take these deadly brutes alive by pressing on the back of the neck with a cleft stick.

A cerastes opened by Bruce contained the remains of a jerboa, and those obtained by Dr. Anderson were

all taken from holes such as would be occupied by rodents or insectivora. Hence it would be interesting to know whether the Algerian shrew possesses in its musky odour any safeguard from this terrible enemy which, rousing at twilight like its victims, can writhe its way into the smallest crevice, its forked tongue quivering from its mouth as it hunts diligently and silently through the hot African night.¹ One recollects in this connection the Gaboon puff adder (*Bitis Gabonica*) as figured over the title "Death" in a recent work by Sir H. H. Johnston. The deadly reptile, brilliantly arrayed in a scaly mosaic of pinky grey, lemon yellow, and what not, lies on the leaf-strewn path of an Uganda forest, its body prone to earth, and its flattened head eloquent of malignant hostility. Similarly does the cerastes constitute the hideous *memento mori* of the Saharan desert; indeed it has been thought by some to have been the asp which slew Cleopatra.

The elephant shrew was first discovered by Captain Rozet in the neighbourhood of Oran. He forwarded the specimen to M. Duvernoy, who in 1832 described it in the Memoirs of the Strasburg Natural History Society. M. Wagner also obtained this species near Algiers; examples are known to have been preserved in the collection of

¹ The word "writhe" is used advisedly, as the *The Field* for 1904 contains a figure showing the mode of progression employed. The cerastes moves by means of a strong lateral curving of the body, thus presenting quite a crumpled up appearance when viewed from above,

M. Parzudaki at some period during 1832-43; and Commandant Loche, who published a catalogue of Algerian mammals in 1858, found it at Aïn el Ibel. The macroscelides thus became pretty well known as an interesting natural curiosity. Duvernoy even seems to have possessed duplicates, for one of his spirit specimens was acquired by the Leyden Museum only four years after the macroscelides had been discovered. General Vaillant was so interested in these quaint insectivora that he offered rewards for specimens. He was supplied by his Zouaves with other rats upon whose muzzles the tails of their comrades had been grafted! So well had the fraud been executed that these sham macroscelides were sent unsuspected to Paris before the deception was recognised. Perhaps it was the receipt of these strange counterfeits which prompted the statement, published in a well-known Natural History, that the Algerian jumping shrew had been imported alive into France!

The *Gazette des Tribunes* gave many years ago a report of a lawsuit brought by a certain M. Triguel against a retired Zouave named Girome, who had defrauded him of a hundred francs (£4) by this hoax. M. Triguel had purchased of the Zouave a "trumpet rat." This beast had on its nose a short trunk containing vertebræ and broader at the summit than the base. Such an "abnormality"—bony as well as muscular and inverted at that—should have put M.

Triguel on his guard; but since the animal cried out, winced, and bled when the trumpet was pricked, he credulously purchased the rat. The deception would probably have gone undetected, for M. Triguel was delighted with his new acquisition ; but having purchased of the Zouave a female *rat à trompe* (home made as before), her young ones even in six months remained trumpetless. A friend of M. Triguel's, an officer who had long served in Africa, explained to him the grafting process ; adding "les rats n'ont pas de trompe ; vous avez été trompé!" Hence the lawsuit ; but by a quibble the Zouave and not M. Triguel obtained the verdict. This method of grafting consists of tying down two live rats and inserting the tail of the foremost into a slit cut in the nose of the other; after forty-eight hours, union being complete, the tail of the front rat is cut off to the desired length. The presence of vertebræ and the topsy-turvy appearance of the false proboscis is thus explained. English readers will find a similar specimen preserved in the Royal College of Surgeons' Museum ; namely, the head of a cock into whose comb John Hunter had successfully grafted a spur during the bird's life time.

The *true* elephant shrew has been taken alive, but like so many of the insectivora soon dies in captivity; the same is recorded of the Central African shrews *Petrodromus* and *Rhynchocyon*. M. Lataste has related that three young ones which he captured

in Algeria died after a few days; another which he dislodged from amongst some stones near Batna on June 8th, 1881, could not be taken at all, though it stood on its hind legs pertly watching him with erected ears at a distance of several yards. Perhaps with very great care and a continual supply of insect food (mealworms) live *macroscelides* might be brought over to Europe. In 1903, no less than four *Cape* jumping shrews were safely brought to England, while, twenty years previously, a bluish shrew¹ (*Crocidura caerulescens*) bore the long journey from India very well, and was purchased (on April 19th, 1883) for the Zoological Gardens. The experiment would be well worth trying on the Algerian species.

In 1903 the present writer traversed the high plateaux of Algeria, the home of the elephant shrew. This region, lying between the fertile littoral of the Tell and the arid wilderness of the true Sahara, presents on either side a series of terraced gradients more or less covered with stunted scrub. Several salt lakes occur in the plateaux region. In spite of the rugged barrenness of the surrounding country these "chotts" are very interesting from the number of waterfowl which frequent them, and from the picturesqueness of the surface, due to the blue tint of the saline water. In travelling between El Guer-

¹ The bluish shrew is, however, but remotely related to the *macroscelides*. It possesses in greater degree the musky odour already mentioned as common amongst *Insectivora*; and hence is known to Anglo-Indians as the "musk rat."

rah and El Kantara the writer observed a considerable number of storks sailing over the rugged moorland on expanded pinions, or sedately patrolling the herbage in parties of ten or a dozen individuals ; at El Guerrah they had preserved a flamingo, which had doubtless been shot in the district. The southern slopes of the plateaux were as desolate as the Sahara itself. Barren hills dotted over with scanty vegetation ; rocks tinted with hues of slate, purple, and orange ; abundance of sand and desert bushes barely two feet in height marked the valley of the Oued Fedala. Passing through the Gorge of El Kantara with its limestone cliffs, one saw the great oasis with its thousands of palm trees thrusting their heads towards the sky of Africa. The Djebel Metlili mountains, famous for their wild sheep, were left behind ; we had passed from the plateaux country to the open desert.

The Sahara itself being also the abode of the present species, a few words may here be devoted to a description of the plain of El Outaïa. Noteworthy for its immense sandy expanse, this desert tract is watered by the Oued Biskra, which is in summer a scanty though permanent stream running over a rocky bed. Here and there one comes upon the encampments of desert nomads, with their striped tents and attendant camels; in places, also, enterprising Arabs struggle to win a thin crop of corn from the sullen soil. Rude huts of

sun-dried mud, roofed with palm wood, constitute the architecture of the few native villages; at the Fontaine des Gazelles there is a marsh due to the presence of a saline spring. The vegetation (save for palm trees at El Kantara and Biskra) is as miserably stunted as in the high plateaux; brilliantly tinted rocks and barren hills complete a picture of savage desolation, rendered more impressive by the overpowering silence of that region of sand.

Although the above description will give an idea of the home of the elephant shrew, the traveller is too frequently obliged to trust to luck to obtain any specimens he may desire. One may, as recommended by M. Lataste, pay a few poor or idle Arabs to obtain the animals; or one may set traps, as for snaring birds. The *macroscelides* occurs near the interesting city of El Aghouat or Laghouat, famed for its 21,000 date palms, for its mosque and oases. Any person travelling merely to see the country might spend a few days in searching the neighbourhood for the elephant shrew; or the alfa gatherers whose huts may be seen at Bou-Cedraia, 241 kilometres from Blidah, on the road to Laghouat, might be enlisted in this service. Unfortunately, the cerastes viper abounds in these wildernesses, and its inconvenient habit of half-hiding in the sand by no means increases one's sense of security. These set-backs well illustrate the difficulties which hamper the zoologist who in a wild and remote country attempts

to make collections. Hence it is small marvel that as yet naturalists have but little acquaintance with that extraordinary pseudo-rodent, pseudo-marsupial insectivore, the Algerian *macroscelides*; and that scant progress indeed has been made, in this sense, with the "taming of the shrew!"

THE CLOUDED TIGER.

"I am much interested at present in establishing a grand zoological collection in the metropolis, with a Society for the introduction of living animals, bearing the same relations to Zoology as a science that the Horticultural Society does to Botany."

Sir Stamford Raffles to the Rev. Dr. Raffles, March 9, 1824.

Omne vivum ab ovo. Comparatively few persons in the crowds of visitors to the London Zoo are aware that the Gardens are the property of an old-established and learned Society, founded in the reign of George IV. by the efforts of Sir Stamford Raffles, its first president. The first meeting to discuss the formation of the Zoological Society took place on April 29, 1826, at the "House of the Horticultural Society;" while the first *animals* contributed to the collection consisted of a griffon vulture and a white-headed eagle from Mr. Joshua Brookes, and a female deer from Sangor. Still flourishing after passing through many vicissitudes, this popular institution has undergone an evolution as progressive as that of the animals which it exhibits; while the bust of Sir Stamford, set on high in the lion house, constitutes a fitting link between the present and the past. Aptly, indeed, is this sculpture placed over a collection of living *Felidae*; for the founder of the Zoological Society was not only an accomplished



CLOUDED TIGER.

Note the elongated head and tail. The handsome open blotches have faded with advancing age till only the velvety margins remain: they are thus half-way between spots and stripes. Although this individual has been under observation for the last five years, a satisfactory photograph was only obtained in May, 1905.

naturalist, but was also the discoverer of a rare and beautiful cat—the clouded tiger of the East Indies and South-Eastern Asia.¹

Standing about seventeen inches high at the shoulder, with a total length of some five feet and a half, the clouded tiger (*Felis nebulosa*)—arimau (or rimau) dahān of the Malays, pungmar and sarchack of the Lepchas—is remarkable for its short legs, for its elongated neck and body, and for the generous proportions of its thick and handsome tail. The skull is much lengthened from before backwards and compressed laterally, while the vertex is so flat that face and forehead are almost on a level. The ears are short and rounded; the eyes are yellowish in youth and brownish when adult, being beautifully stippled save at the circumference with blackish atoms. The ground colour of this tiger is greyish or yellowish brown, fading to whitish below. A few solid black spots occur on the head and limbs; there are always two black streaks on each side of the face, passing upwards and outwards from the outer angle of the eye and that of the mouth respectively. The neck is longitudinally banded with black, and a ribbon of the same colour crosses the throat. The ornamentation of the body is very handsome, consisting of a series of elongated vertical rings (better defined posteriorly than in front) and smartly differentiated

¹ The clouded tiger living in the London Zoological Gardens in 1880 was most appropriately exhibited in this building, a living memento of the illustrious founder of the Society.

in velvety black from the general body colour. The long tail is belted with sable and tipped with tawny grey. It may here be mentioned that the tail of the clouded tiger, although of ample proportions, suddenly becomes narrower in its posterior sixth, ending in a blunt cone-like tip. This circumstance appears to be unknown to the illustrators of natural histories.

Such then is a description of a typical *Felis nebulosa*; but like so many of the cat tribe, this beautiful beast exhibits great individual variation, some examples being greyer, others more tawny than normal. It should also be noted that, as remarked by Horsfield long ago, a tawny suffusion apparently increasing with age can be detected on the under parts. Old specimens are deeper fulvous than their juniors, while the blotches on the body tend to disappear, only their black margins remaining.¹ The clouded tiger is an interesting beast to evolutionists; for if we accept Eimer's theory that striped mammals have been developed from spotted ones by a gradual elongation of the spots, then one has in *Felis nebulosa* the transformation actually taking place under one's eyes. Even the vertical semi-rings of the young animal are half-way between spots and stripes; the adult with the blotches faded away to mere marginal streaks, and its coat brightened by a tawny-fulvous

¹ The young specimen in the Liverpool Museum (labelled *Felis caffra*) has the merest apology for blotches; even the margins appear as mere streaks.

suffusion has practically changed from spots to stripes! The true tiger (*Felis tigris*) of the Bengal jungles still shows occasional double stripes, which, on Eimer's theory, are but altered semi-rings.

The skull of the clouded tiger is remarkable for the very long canine teeth (half as long as the palate); they are conical, sharp-edged behind, and minutely serrated, recalling the terrible weapons of the sabre-toothed tigers, now happily extinct, which in Pliocene times ravaged Britain and in Eocene times ranged France.

Widely distributed in the Malayan region, the clouded tiger not only inhabits the islands of Java, Sumatra and Borneo, but also occurs on the mainland in Siam and Burmah, in Hainan and Sikkim; in this last district it appears to be fairly common, although from its nocturnal habits it is but seldom seen.¹ In Borneo the skin of this animal has been extensively used by the Dyaks. Temminck, writing in 1827, observes that he had seen some jackets made of its hide and bordered with several rows of white shells. "La peau de ce Tigre parait leur servir de vêtement principal." Mr. Hose has noted that the Kayans and Keniaks of Borneo use the skin of the *Felis nebulosa* for war cloaks and its long canine teeth as

¹ The clouded tiger inhabits even the lesser East Indian Islands. Two young ones, now in the Leyden Museum, were obtained on the Batoe Islands between Padang and Anjerbangies in 1877.

ornaments.¹ This species has been said to inhabit Thibet, a statement rightly contested by Dr. Jerdon, who pointed out that so treeless a country was little suited to a forest-lover like the clouded tiger. The animal is certainly found at considerable elevations; Mr. Hose found Bornean examples on Mt. Dulit at a height of 5,000 feet and on Mt. Batu Song as far as 2,000 feet. Nevertheless, this very circumstance tends to strengthen Dr. Jerdon's objection; for in the high regions of Sikkim the range of the clouded tiger becomes co-terminous with that of the snow leopard or ounce. Both animals are large cats with handsome variegated skins and ample tails; both inhabit remote regions and hence both are (or were) almost unknown to Europeans. Hence any naturalist relying, as one is often obliged to do, on native reports more or less imperfectly understood might readily confuse the two. Even a description *accurate as far as it went* might when conveyed in a native dialect be quite misleading. A description of the now famous okapi of the Congo forest as a horse-like animal with more than one hoof, might well lead an explorer to suppose that it had a three-toed foot like the extinct *hipparion* of Pliocene France.² The badger-like káureke, said to have formerly inhabited the Timaru district of New

¹ The present value of a clouded tiger skin in the London market is about £3 or £4.

² See Sir H. H. Johnston's work on the Uganda Protectorate, vol. i., p. 380, for this very point.

Zealand, cannot now be found *as such*, and was probably an apteryx.¹ In the same way the snow leopard, described as a predaceous beast with spotted coat and ample brush, might well be confused with the clouded tiger, an animal notable for its blotched coloration and long tail. Dr. Jerdon had a kitten of the *F. nebulosa* which was taken at Darjeeling; it is interesting to remember that in this very region the thickets are said to lead up in ascending sequence through the zone of maple woods and pine forests to the high Alpine glens, bright with gentian and ranunculus, the chosen home of the snow leopard!²

As already mentioned, the clouded tiger is a forest species: it spends nearly all its time in the denser jungles, sleeping in the forks of the trees and

¹ The apteryxes or kiwis are wingless birds which from their hair-like feathers, nocturnal habits and great running powers recall rats or rabbits. At the present time, no less than eleven of these almost extinct birds—probably the largest series ever exhibited at one time in captivity—are in the London Zoological Gardens.

² The snow leopard (*Felis uncia*) is a beautiful creature, remarkable for the thickness of its greyish white fur, which is ornamented with black rosettes, as in the common leopard. Once so rare that its very habitat was unknown, it has of recent years on several occasions been brought alive to Europe. A specimen, said to have cost £200, was exhibited in the London Zoological Gardens in 1891, and another at Antwerp about the same time. A third example, sent to Liverpool, is now in the Manchester Museum; a fourth—formerly a lady's pet—was living in the Regent's Park Collection in 1897 (?) and has been beautifully portrayed in a well-known series of animal photographs. Another example, taken in the Pamirs, was presented to the Zoo by Captain McKintosh in 1904; in the same year a magnificent exhibit of three snow leopards—two females and a male—was displayed at the New York Zoological Park, all being the valuable gift of one donor. One of the females having escaped through a skylight was unfortunately shot; the others are still on exhibition at the time of writing. The snow leopard has never been known to attack man and resembles Grévy's zebra amongst the *Equidae* in its relative tractability and in the ease with which it can be tamed; unfortunately, the damp climate of England is detrimental to it, and all the London specimens are now dead.

preying upon birds and small mammals. Doubtless its blotched fur, by harmonising with the lichenized trees, greatly assists it in ambushing its victims. Its nocturnal habits are again an assistance, the dusk of night masking its approach. An abundant supply of live food flourishes in the Malay thickets. Fruit pigeons and other birds may be seized when roosting, or the tupaias and flying squirrels surprised as they twitter in the fast gathering twilight. The dainty napu chevrotain trips to the water at sunset, timid and defenceless like a tiny deer; the Argus pheasant calls loudly in the forest clearings. In more settled districts the clouded tiger descends to the level of a mere farmyard robber, preying upon the hen roosts of the Lepchas and Malays. True to its cat-like instincts, it waits till darkness sets in; then it leaves the forest, as the streams of foxbats flap overhead and the wild pigs go forth to ravage the crops of tapioca and pineapple.

The clouded tiger appears to have first become known to Europeans from an individual, referred to this species, brought to England about 1815. This beast, known as a "Fox-tailed tiger" (afterwards as a "tortoiseshell tiger") was exhibited for some time in the menagerie at Exeter 'Change¹ in the Strand. It afterwards died in a travelling menagerie at Axminster, and the tanned skin was sent unmounted for exhibition in Mr. Bullock's museum at the Egyptian

¹ Now Exeter Hall

Hall, Piccadilly. From its name of "tortoiseshell tiger," the shortness and stoutness of its legs, and the length of its tail, Dr. Horsfield accepted it as an undoubted *F. nebulosa*. Unfortunately he neither seems to have seen the animal nor was he able on enquiry to learn what had become of it: he could find no record of it in the sale catalogue of the Bullock Museum in 1820. It is probable, however, that this skin was the same as that mentioned by the Rev. J. G. Wood in his "Illustrated Natural History": he states that the first clouded tiger or "rimau daham" seen in England was kept in a travelling menagerie, and that after its death, the skin was ignorantly cut up into caps for the keepers. One wonders that Bullock did not permanently add it to his Museum.

Be this as it may, to Sir Stamford Raffles is generally assigned the credit of discovering the clouded tiger. He obtained it from the forests of Bencoolen in Sumatra, and published the first distinct notice of it under the name of Rimau Dahan in the thirteenth volume of the Transactions of the Linnean Society. "The Rimau Dahan is about the size of a leopard but is of a darker colour". On leaving Bencoolen for England by the ship "Fame" on February 2nd, 1824, he shipped a large natural history collection, together with a living "rimau dahan." This was a kitten already ten months in Raffles' possession. The youngster was perfectly

tame and playful, and at least two-thirds grown ; it would have made a very interesting and valuable exhibit in the Zoological Gardens which Sir Stamford wished to found in London. *Dis aliter visum.* On the same day that the "Fame" set sail, a steward going with a light to draw some brandy carelessly set the spirit on fire. The ship blazed up so furiously that Sir Stamford and the others had barely time to bundle themselves overboard before the whole afterpart of the "Fame" was alight ; the children were snatched from cots which were already on fire. Crowded together in a couple of boats, the ship's company were in a serious fix, with but little clothing, and neither food nor water. Happily the captain had a compass, and leading the way in the larger boat, set the course N.E. for Bencoolen ; pulling manfully at the oars the stout fellows made the coast of Sumatra at day-break. The ship they had left continued to burn ; with masts swaying and shrouds ablaze she acted as a beacon. The boat's company were taken on board a vessel sent out in relief. Happily all had been saved ; even Johnson, the sick seaman, had been brought off at the last moment.

Nevertheless, the burning of the "Fame" was a great disaster to Raffles. All his natural history collections—including the clouded tiger—had perished in the ill-fated vessel ; all his papers and drawings, in short, everything—the labours of long

years. With true British pluck, on his involuntary return to Bencoolen, he set to work to make new collections; hunters were sent into the forests to obtain more specimens, and draughtsmen were again employed to make drawings. In a few weeks this indomitable and versatile man—governor, historian, linguist and naturalist all in one—had accumulated a second collection which, if not as valuable as the first, was at any rate a splendid addition to zoological science. He had even succeeded a few days before his departure in obtaining another clouded tiger from the neighbouring forests ; it was younger and if anything even tamer than the first. With these creditable witnesses to his untiring perseverance and industry he set sail for England in the “Mariner” on April 8th, 1824.

About this time Coenraad Temminck, the first director of the Natural History Museum at Leyden, and already known as a distinguished ornithologist, drew up an account of the clouded tiger from specimens—unfortunately only imperfect skins—preserved in the museums of Paris and Leyden. In April 1824 he visited England, communicated his description to Dr. Horsfield, and himself examined a mutilated skin of *F. nebulosa* which had been sent over by Dr. Finlayson, then lately deceased, and was preserved in the East India Company’s Museum in Leadenhall Street. It was apparently a little later than this that an adult skin and skeleton

of the "rimau dahan" obtained by M. Diard was added to the Leyden Museum.¹

On August 8, 1824, Sir Stamford Raffles landed at Plymouth. His collection was presented partly to the East India Company's Museum and partly to that of the Zoological Society which he afterwards founded. The tree-tiger had continued in excellent health through a long and tempestuous voyage; playful and amiable, it even romped with the passengers and a little Musi dog that was on board, and toyed with its food like the light-hearted kitten it was. The London Zoo lay yet two years in the future, so the little tiger was placed under the care of Mr. Cross in the menagerie at Exeter 'Change. Here for several days amid its unaccustomed surroundings it became both shy and savage—probably from sheer nervousness. It has been excellently figured by Wm. Daniell, R.A., in one of its fighting attitudes with snarling retracted lip, half crouching body, and curling tail. In about ten days the animal regained its former composure, becoming playful as before and rolling about like a human infant when noticed or caressed. Much attached to the menagerie attendants and feeding well on beef and fowl's heads, it would doubtless soon have become a great attraction, but unfortunately died after about six weeks in

¹ MM. Diard and Duvauzel were two French naturalists who were collecting in Sumatra during the governorship of Sir Stamford Raffles. The credit of discovering the clouded tiger seems to have been all but assigned to the wrong individual, since one finds that Cuvier on receiving a skin of this species actually proposed for it the name of *Felis diardi*! a term that has unfortunately been adopted by some zoologists.

England, apparently from disorders consequent on cutting its second set of teeth.¹ The skin was preserved and ultimately presented to the Zoological Society by Raffles; the specimen was still in their museum in 1838, though erroneously stated in the catalogue to have "died in the menagerie." Such was impossible, for the Zoological Society's menagerie did not exist till 1826, by which time the clouded tiger had been dead two years. The Society's museum in 1838 also contained a second very young specimen. In 1862 the British Museum contained three Indian and one Sumatran skin of the rimau dahan.

The romance which early surrounded this beautiful beast received a fresh accession in the middle of the last century. Mr. Swinhoe, a British Vice-Consul, made during 1861-64 a long stay on the island of Formosa, then but recently thrown open to trade. Having visited Sawo and Lungkeaw, he noticed that the savages of the interior of the island used to bring to the coast numbers of skins to barter with the Chinese. He obtained from amongst these three curious specimens, two being adult and a third apparently immature. Closely agreeing in coloration with the clouded tiger skins which he had seen in the British Museum, these pelts differed from them in their yellower tint and in the shortness of the tail. The typical clouded tiger is noted for the ample

¹ The second canine had already cut the jaw.

length and fulness of this member; so he distinguished his new discovery by an allusion to its shortness, styling his find *Leopardus brachyurus* in the description which he forwarded to the Zoological Society. Dr. Gray, writing on the Formosan animal in 1867, called it *Neofelis brachyurus*; recent naturalists, however, have agreed to consider it merely as a short-tailed and local race of the rimau daham. The great range of variation amongst the *Felidae* renders them very difficult to study, and even to-day naturalists are not yet agreed as to the number of true species in existence. Many of the cat tribe occur in two phases, dark and pale; individuals of the same species may differ in size, in markings, in ground colour, and even, as we have just seen, in the length or shortness of the tail. Hodgson many years ago supposed the small Himalayan race of the clouded tiger to be a distinct animal, which he called *Felis macroceloides*; thus naturalists fond of making new species might divide the present one into a Sumatran, a Formosan, and a Himalayan form.

It is a remarkable fact that there are many animals which, although in their native land but little known to Europeans, nevertheless turn up with considerable regularity in the lists of animals offered for sale by the wild beast merchants. Such species as the addax, bubaline, and leucoryx antelopes are often exhibited in the zoological gardens of Europe; the sing-sing waterbuck may be seen in

every collection of any size, and the binturong or bear-cat is repeatedly offered for sale. The clouded tiger is one of these remarkable beasts, yet one would suppose that the reverse would have been the case when the difficulty of obtaining it is carefully considered. To begin with, it inhabits dense jungles carpeted with a thick and wellnigh impenetrable undergrowth, and swarming in the rains with bloodthirsty leeches, which drive away even the beasts of the forest. Secondly, it is inconspicuous among the trees from its marbled coloration. Thirdly, it is thoroughly arboreal—hence difficult to trap or snare; for the object of the trapper is, of course, not to shoot but to *capture* his quarry. Again, it may not stir till dark intensifies the gloom of the forest, barely illumined by the glow of the fungi which batten on the rotten wood. All these adverse combinations considered, it is indeed remarkable that quite a number of *F. nebulosa* have at various times been brought alive to Europe.

The first example received at the London Zoo (the old Museum catalogue notwithstanding) was purchased on May 16th, 1854. It came from India, and was figured by the well-known animal painter, Joseph Wolf, in his series of animal drawings for the Zoological Society; the new addition is represented as reclining on a branch with head raised, as if scenting danger, while the tail curves tensely forwards under the bough. The same individual

was also figured by Harrison Weir in the Rev. J. G. Wood's "Illustrated Natural History"; the characteristic elongation of the skull is capitally rendered. This specimen is now in the mammal gallery at the Natural History Museum, having been added to the National Collection in 1857; it has been fairly well set up in a typical attitude, though the conical tip to the tail characteristic of this species has not been reproduced by the taxidermist, and the tail itself does not hang naturally. Another clouded tiger (from Assam) was purchased for the Zoological Gardens on March 12, 1862. A very fine Burmese specimen was bought on January 26, 1875, and on the opening of the new lion house in 1876 was most appropriately included amongst the series of exhibits which graced the newly-installed building. All these animals were males; they were soon tamed and spent most of their time in sleep. The last of the three lived about five years in the collection; he was kept in a sleeping den at the back of a cage in the lion house, and let out every evening about half an hour before the gardens closed. A young male died in the Rotterdam collection in 1873; its skin and skeleton are now in the Leyden Museum.

A young female of this species was purchased by the Zoological Society on March 16th, 1899; she is still (1905) living in the Gardens, and her photograph appears at the head of this Essay. Tame enough

to her keeper, and even coming up to the bars to be fed, she is nervously distrustful of strangers, and the presence of a crowd of excited children before the cage promptly elicits a deep bass growl or an angry warning snarl. Active in the earlier part of the day, when the sun grows hot she becomes lethargic, either sleeping curled up on her straw—a living mosaic of colour—or else reposing flat on her shelf, sometimes with the long tail hanging down like a creeper dangling in a forest.¹ When climbing the clouded tiger is a most graceful beast. Sir Stamford Raffles's specimen would jump to the top of the cage and cling lithe and muscular to the roof, or would twist round and round in playful sport, the handsome tail whirling after it like the expanded brush of a squirrel. When on the ground, owing to its short legs, the clouded tiger walks with a sailor-like slouch. A mate for the Regent's Park animal,—being a wild and newly-imported specimen purchased from Cross, of Liverpool, for £30—was received at the Gardens in September, 1904. Naturalists had thus (probably for the first time in the annals of Zoology) a brief opportunity of comparing in the same collection and under the same conditions of housing,

¹ Perhaps this latter habit renders the wild tree-tiger more inconspicuous when asleep, the Malay forests being over-run with various parasitic creepers. The Rev. J. G. Wood states that he saw the specimen of 1854 lying on a branch in its cage, with its cheek pillow'd on a branch and all four feet hanging in the air. As already mentioned, the tail of the clouded tiger, though of ample proportions, suddenly narrows to a conical point in the terminal sixth: it thus actually suggests the tip of a growing creeper! By the way, the native name of the black panther is *Rimau* (or *Arimau*) *akar*=tiger of the lianas.

climate, and diet, the natural attitudes and attributes of a *pair* of these beautiful animals. Unfortunately the male died after about a week in London. Another clouded tiger was purchased on June 20, 1901, for the Philadelphia Zoological Gardens.

One word more. The student will find amongst the mammalia several curious cases of giants and dwarfs occurring in the same family—perhaps even the same genus—the smaller animal often to the unskilled observer seeming merely an absurdly faithful replica of its congener. The striped hyæna, strong-jawed and ravenous, has a “double” in the feeble-toothed aard wolf; the greater kudu with its curling horns and tall stature is duplicated by the lesser kudu of Somaliland; the common hippopotamus is represented in Liberia by a pigmy species the size of a heifer. So also is the clouded tiger simulated in pocket edition by the marbled cat (*F. marmorata*) of the same regions, though the latter species has a shorter face and a higher forehead. The *F. marmorata* was first described by Mr. Martin in the proceedings of the Zoological Society for 1836. As regards *markings*, one finds the same semi-rings or blotches on the fur, vertically disposed as in *F. nebulosa*; the small solid spots on the limbs and head and a few of the rings on the tail are also there with almost uncanny fidelity, though the tail rings may be incomplete. One even notes (in some specimens at any rate) the black lines at the angle of eye and jaw seen

in the clouded tiger. "It is a Rimau Dayan in minature" as Martin himself observed; indeed, so accomplished a naturalist as Jerdon actually supposed that the two *marmorata* in the Edinburgh collection were examples of the true clouded tiger. The specimen described by Mr. Martin had been obtained in Java or Sumatra by Mr. Gould. Schwaner obtained the marbled cat in Borneo ; it is also recorded from Sumatra, Malacca, and the Himalayas, thus parallelling the *distribution* as well as the appearance of the clouded tiger. Although it is little known in collections of living animals, a specimen of the marbled cat, together with two young *F. javanensis*, was received at the Zoological Gardens on May 29, 1885, having been presented by Frank Swettenham, Esq., author of "Malay Sketches," and Acting British Resident at Perak, in the Malay Peninsula.

The marvellous resemblance between clouded tiger and marbled cat reminds one of the likeness of Rudolf Rassendyll to his cousin King Rudolf V. in the "Prisoner of Zenda." Truth, however, is much stranger than fiction. King Rudolf had but one double; the clouded tiger has *two*. This second duplicate is the Thibetan cat (*F. scripta*), which in higher latitudes represents the marbled cat of the South. First obtained by Père David in the Principality of Moupin, it inhabits hill forests like the clouded tiger. The Thibetan species is rufous brown on the head and back, yellowish buff on

the sides, and white below ; like its congeners, it is ornamented with open blotches, which are black externally and light brown internally. The throat is crossed by a black line; there are *the same facial stripes, the same solid black spots on the limbs, and the same rings, or semi-rings, on the long black tail.* Some naturalists indeed may be inclined to rank the *Felis scripta* as little more than a northern race of the *F. marmorata*. In any case, the three species just described together form a most interesting natural group, standing quite apart from the majority of the Asiatic cats.

Recent zoological research has indicated a yet further development of this wonderful scheme of blood-relationship. Closely allied to these three animals is the handsome Fontanier's cat (*F. tristis*) long known only from an imperfect skin purchased in Pekin many years ago by M. Fontanier. This beast is of a bluish grey colour, blotched with blackish brown (paler grey in the centre of the blotches); it also has solid spots on the legs, barred cheeks and forehead, and a longish tail ringed with black. The "Nepal Tiger Cat" which died in the Zoo previous to 1855 may have been this species, judging from a figure published by Knight in his "Museum of Animated Nature"; if so, it must have been a most valuable acquisition to the menagerie, though probably at that date the extreme rarity of the specimen

was not realised. A beautiful figure of Fontanier's cat, restored from the mutilated type skin by the magic hand of Joseph Wolf, will be found in Elliott's "Monograph of the Felidae;" the pose of the head and forelimbs and the sweep of the tail leave nothing to be desired. A fine specimen from East Central Asia may be studied in the lower mammal gallery of the Natural History Museum.

Now Professor Elliott remarks of the Thibetan cat "its markings are similar in kind to those of the spotted cats from America rather than any of the Old World species." *Nota bene.* The "spotted cats from America" (*i.e.*, the ocelot and margay tiger cats) in their longitudinal, pale-centred blotches, in their facial stripes, their banded throats, and their handsomely spotted limbs constitute a second natural group, indicating a remarkable affinity between the *Felidae* of America and those of Central Asia. On one hand, clouded tiger, marbled cat, Thibetan cat; on the other, ocelot and margay; the groups are linked together by Fontanier's species, which has been aptly styled the Asiatic ocelot, and seems to combine in its sturdy person the characters of either group. Fontanier's cat is a "missing link," a bridge over a biological chasm, a keystone in an evolutionist arch; *quācumque jeceris stabit*, like the three-legged symbol of the Isle of Man. The other Asiatic *Felidae* differ widely from the above mentioned animals. The Javan cat, rufous grey spotted with

black-brown; the rubiginous cat, flecked with rust red on a yellowish ground; the *F. euptylura*, brown-yellow-grey with large reddish spots; the *F. shawiana*, greyish fulvous sprinkled with black like a serval cat, constitute with some others an entirely separate group. In this connection it is interesting to remember that Geoffroy's cat of South America occurs in *two* phases, one having largish blotches with pale centres, the other being punctated all over with small solid spots; two distinct types of coloration thus occur in the same species.



HUNTING LEOPARDS SUNNING THEMSELVES.

Note the strange mixture of cat and dog in the faces of these animals. The dignified expression well-fitted the hunting leopard in the days of heraldry to figure as the emblem of the English nation, "an old and haughty people, proud in arms."

THE HUNTING LEOPARD.

“Come, confess, good brother,
You did your best or worst to keep her Duchy,
But that the golden Leopard printed in it
Such holdfast claws that you perforce again
Sank into France.”

Tennyson's Becket, Act II., Scene 2.

Readers of the works of Sir Walter Scott may remember how in “The Talisman” Sir Kenneth of Scotland is represented as wearing for cognisance the device of a leopard with a collar and broken chain, in allusion to his recent captivity. In actual life that very real person, William the Conqueror, bore for arms two golden lions or leopards (signifying Normandy and Maine) displayed on an appropriate field of blood red. Like the lion, the leopard figured largely in heraldic zoology and even according to the French authorities appeared on the royal arms of England; Henry II. is said to have adopted the device of three leopards (lions according to some) in allusion to his Duchy of Aquitaine, acquired through his wife Eleanor. Henry III. kept in his menagerie at Woodstock the leopards presented to him by his brother-in-law, Frederic of Sicily, one of the best known of royal naturalists, who employed these beasts in coursing game. If, as is stated, the English King really adopted them on his coat of arms, the heraldic draughtsmen would

not lack living models! Edward I., according to the roll of Caerlaverock, displayed three "leopards couchant" as the royal cognisance; according to other authorites, however, the device consisted of three *lions* "passant gardant." Tabard and oriflamme, tressure and inescutcheon are terms having but little significance to-day; yet from its antiquity the science of heraldry is of considerable interest, transporting one to the days when royal Edward watched the fight from the windmill of Crécy, or Harry of England captained the arrow rain of Agincourt. A singular circumstance should here be recorded; it seems probable that the beasts sent to Woodstock by Frederick II. were not common leopards but cheetahs, or hunting leopards, still trained in the East to take game for their masters. Frederick certainly himself used cheetah for hunting on his return from the Crusades in 1231; one thus has a very practical explanation of the collar and chain borne by leopards on coats of arms.

The hunting leopard (*Cynaelurus jubatus*)—cheetah of many writers—luipaard and vlaakte tiger of the Boers and Colonial Dutch—leñau of the Bechuanas—stands about thirty-one inches high at the shoulder. Average specimens tape about seven feet in total length, two and a half feet of this measurement being occupied by the tail. The face and ears are much shorter and the vertex of the head more vaulted than in the true leopard; the body is

slender, set on very long legs, and furnished with an ample tail. Although included in the cat family, the cheetah is remarkable for its crisp and coarse fur, quite different from the short sleek covering of normal *Felidae*; on the neck the hair is developed into a semi-mane. The claws of the hunting leopard are but semi-retractile and cannot be completely sheathed like those of normal cats.

The ground colour of the present species is fawn paling to white; it is promiscuously covered with round black spots "semée over a field tenne" as the heralds woulds have said. Indian and most African examples have a black streak running from the inner angle of the eye to the upper lip. The terminal halt of the white-tipped tail is ringed with black. Occasionally there are curious departures from the typical coloration which perhaps indicate a tendency to albinism. Thus, on May 29, 1877, the Zoological Society purchased from Mr. Arthur Mosenthal an aberrant cheetah in which the facial streak was wanting, while the black spots were replaced with fulvous, and the fawn ground colour by isabelline. This animal was at first regarded as a new species under the name of *F. lanea*, but is now considered as a mere variety of the typical form; a similar example is in the Capetown Museum. The extreme south of Cape Colony seems for some reason to be specially favourable to albinism; both these examples came from Beaufort West, a sanatorium in the

Great Karroo desert, famed for its springbok shooting. On the other hand, a *blackish* specimen of the common leopard was recorded from Grahamstown in 1885, and another in 1886, while two other examples are known—all from the Albany district at the Cape. Young cheetah at a few days old are greyish white above, dark chestnut below and on the limbs. The streak on the face appears first, but other markings—blackish brown in colour and longitudinal in direction—may be observed on turning back the long fur of kittenhood.

Although widely distributed throughout the greater part of Africa, and also found in Syria, Persia and India, the hunting leopard owing to its semi-nocturnal habits frequently escapes observation. Sir Cornwallis Harris in an expedition of five months saw but one, which was shot by his friend Richardson; Drummond, on a much later trip, saw but two.¹ Occasionally these great cats are abroad in daylight, if the weather be cloudy.² A party of six going at a quick walk through the scrub was observed in Somaliland some years ago; Mr. E. Wynstone Waters records two which he observed in January 1902 near the Eldama Ravine Station in Uganda, playing together like a

¹ From the ease with which it is said that cheetah at a distance may be mistaken for immature lionesses or for wild dogs they perhaps escape recognition even when seen.

² The strange nondescript animal, resembling a puma, which Andersson mentions having seen one cloudy day, seems to have been a cheetah. See "Lake Ngami," by C. J. Andersson.

- couple of greyhounds newly unleashed. Young ones have occasionally been picked up out of long grass ; to find such mites is of course like searching for the proverbial needle in a bundle of hay. The cheetah differs from the true leopard in avoiding dense forests, preferring open grass land or desert, dotted over with small bushes which afford cover when stalking game. It lies up in the daytime in caves in rocky hills, stealing out at dusk as the gazelle and pallah begin to feed. A combination of rocky kopje and bare rolling veldt well suits the hunting pard; those which inhabit the Sahara perhaps benefit directly by their spotted coats, since the black dots on a fawn ground may well render them inconspicuous by simulating pebbles strewn over sandy desert.

Cheetah are remarkable in hunting in couples or small parties (quite the reverse of the usual practice amongst cats); a single individual has, however, been seen pursuing a herd of oryx on his own account.

The young are trained to the chase by their parents. The quarry being gradually approached by stalking is then run into by a final rush of lightning rapidity. It is killed by compression of the throat (thus dying from asphyxial occlusion of the windpipe) not by breaking the neck, as sometimes represented by illustrators of works of natural history. The victim feels the leopard's fangs

"fixed like an iron vice in its throat" to quote Sir Samuel Baker.¹

Various antelopes (nilgai and black buck in India, springbok, pallah, and even kudu in Africa) together with hares and game birds are pursued by these feline greyhounds. These methodical beasts are said to habitually resort to certain trees in order to sharpen their claws before hunting; after a successful stalk they repose in their rocky fastnesses for two days before resuming the field.

The cheetah shares with the lion and tiger the distinction (*sic*) of being the "jackal's provider." That the jackal is the *lion's* provider has been the usual belief, the former animal being supposed to lead his nobler comrade to the banquet, just as the pilot fish is alleged to act as courier to the shark. It has, however, been proved that the jackal *follows* and not precedes the lion, giving way meekly enough if the original diner return to the "kill." It but takes the leavings of the royal brute, struggling for a share among a crowd of ravenous hyenas and flapping broad-winged vultures. Dr. Jerdon mentions having turned a cheetah and jackal together out of the same ditch; no doubt the jackal merely accompanied the hunting leopard for the sake of what he could get, preferring a diet of antelope meat to the scanty fare

¹ "In all animals that I have observed killed by cheetas, death has been caused by strangulation."—Mr. F. V. Kirby *In Haunts of Wild Game*, p. 553.

of rats, frogs, and carrion, which would be all that his own exertions could provide.

Considerable confusion regarding the present species long existed in the minds of scientific naturalists. The ancients indeed supposed the cheetah to be a hybrid between lion and leopard, the half-mane on the neck and the spots on the body lending some colour to this theory. According to them, the *pardus* was the male of the panther or true leopard; by *leopardus* the cheetah seems to have been meant. In any case, the present species was known to the Greeks and Romans, as shewn by a *bas relief* in the Louvre. Coming to more recent times, we find that Gesner (1551) Chardin (1665) and Bernier all mention the animal, though it was confused both with the Persian race of the true leopard and with the snow leopard of Thibet. Pennant in his "Natural History of Quadrupeds" (1792), first conferred on it the name of hunting leopard, and figured one which had been brought to England from India by Lord Pigot. Although some of the tangle was thus beginning to be adjusted, fresh confusion was caused by the discovery of the same or a similar animal in Africa; Thunberg having in the *Memoires de l'Academie de St. Petersburg* stated its occurrence at the Cape, while Buffon had described a skin received from Senegal. The French naturalist, Duvauzel, when in India transmitted to Europe some valuable

notes and drawings of the cheetah; nevertheless, naturalists continued to be dubious *re* the identity of the Asiatic with the African form. At last, in 1820, Cuvier was able to examine a *living* specimen, which had been presented to the Jardin des Plantes by M. Le Coupe, Governor of Senegal. Tame as a dog, this beast was allowed to take the air during summer in an outdoor enclosure; it seems to have lived about three years in the menagerie, and was probably the young specimen eventually figured under the name of guepard. By means of this individual, the French naturalist was enabled to prove that the Asiatic and African cheetahs were one and the same animal, so that the question was finally set at rest.¹ In 1827, the Pays Bas Museum at Leyden contained specimens of both forms, which afforded an interesting opportunity of comparing Western and Eastern cheetahs side by side. Some ten years later, the museum of the London Zoological Society also contained an example of each, which had died in the menagerie.

Although European zoologists thus spent considerable time in an academical study of the cheetah, the unscientific Orientals had for centuries turned its hunting proclivities to practical account. Far from troubling themselves over abstruse questions of internal anatomy or external mark-

¹ A skin of an African cheetah was presented by Burehell to the British Museum, probably in 1817, when he also gave a blue wildebeest and other specimens to that institution.

ings, these worthies regularly employed it as a kind of quadrupedal falcon. An Ethiopian carrying a log of precious wood and leading in leash an unmistakable cheetah has even been found figured on a tomb in Thebes;¹ but it was Hashing, King of Persia, who, in B.C. 865, first specially bred dogs and leopards for the chase. Yezid, Caliph of Damascus, in A.D. 680 introduced into this sport the risky practice of carrying a "tame" hunting leopard on a pillion behind the hunter; an excellent experiment, doubtless, for other folks to try. Akbar the Great, Emperor of Hindustan from 1556 to 1605, must have eclipsed all previous records if, as is stated, he really used to take the field with a thousand hunting leopards! The relative rarity of the cheetah to-day makes one question this story, however enthusiastic and powerful a Nimrod Akbar may have been. The sport still survives in India, the Gaekwar of Baroda and other princes maintaining studs of cheetah for hunting black buck.

It may not be generally known that in *Europe* also the practice of coursing game with hunting leopards existed for several centuries, Frederick II. of Sicily (already mentioned as the brother-in-law of Henry III.) having introduced the practice. The French kings kept cheetah in an enclosure in the Castle of Amboise, and both Charles VIII. and

¹ On the tomb of Rekhmana at Thebes is figured a procession of slaves bringing gifts to Egypt. One of these, who carries a fan and a basket of fruit, also holds in leash a cheetah, long-legged and small-spotted; two green monkeys and an ibex also figure in the procession.

Louis XII. hunted hare and roebuck with them. Francis I. and Henri II. continued the sport, which died out in the reign of Henry IV., the animals of Marie de Medici, which had been brought from Florence, being the last to be so employed. Many years later, Leopold I. temporarily revived the pastime in Germany; while in England a stupid burlesque of it was perpetrated by the Duke of Cumberland, brother to George IV. It happened in this wise. Tippoo Sahib had kept a stud of sixteen cheetah, and on his being killed in 1799 at the storming of Seringapatam five of the animals became the property of Sir Arthur Wellesley, afterwards Duke of Wellington. Lord Harris having obtained one or two of these leopards (perhaps as a gift from Sir Arthur) the animals were brought to England and presented to the Duke of Cumberland. The latter worthy turned one upon a stag confined in an enclosure; the stag lowered his horns and the cheetah promptly turned and leapt the fifteen foot netting without undue delay. Dashing among the terrified spectators it killed a fallow deer near by, and so ignominiously ended this unsportsmanlike experiment. These unlucky cheetahs of the Duke's were so badly treated and strictly confined that their former docility was lost and their disposition permanently altered; one of them broke his keeper's arm, and soon after this they were transferred from Windsor to the Tower menagerie.

Properly tamed cheetah¹ make the most charming pets; this is easily demonstrated by careful examination of menagerie specimens that have been brought to Europe. Tall and graceful, with a strange disdainful mien which seems to combine the glance of both lion and dog in the limits of the rounded face, the hunting pard is a highly ornamental beast. Small wonder that the Egyptians used to portray it on their monuments with giraffe and oryx, with addax and gazelle! Extremely nervous, these animals are liable to have fits if frightened or chased about; when angry or alarmed they lower the head, erecting the mane into a stiff hockle. An excellent picture of two hunting leopards in the Berlin Zoological Gardens has recently been published in a book of animal photographs; nervousness struggles with curiosity as they stand staring with lowered heads and bristling manes at some object in front of them. When pleased the cheetah purrs and rubs itself against its owner's knees like a cat.

Cheetah are snared in India by springs of antelope sinew pegged in the ground twenty-five to thirty feet from their favourite trees, and set at various angles; the animals are often caught by all four feet at once.

¹ "Trained" cheetah does not mean *tamed* cheetah; the animals used for coursing are in fact little better than half wild, and even in the chase but exert their natural instincts. In 1880 one of these brutes waxing rebellious so injured Mr. Irvine, assistant collector of Vizagapatam, that he died two days later; it is only fair, however, to add that the animal had received great provocation.

A blanket being then thrown over the captive's head it is rendered quite helpless, being taken away ignominiously spread-eagled on a bullock cart. The animal then undergoes a six months' training at the hands of the Vardi women and children, who daily sit by it and keep up a conversation to accustom it to the sound of the human voice. Many of the examples seen in zoological gardens are, however, *African* specimens, probably brought home by officers who, again ordered abroad, deposit or present their pets to some institution where they will be well taken care of. The fine pair of hunting leopards figured at the head of this Essay came from Somaliland, and were presented to the London Zoological Gardens by Col. Mahon. The photograph shows them basking in the sun, at peace with themselves and all the world—great, lazy, contented cats.

THE ANTARCTIC WOLF.

The influence of environment upon the size of animals explains many difficult problems of variation. *Per contra*, from the mere external characters and dimensions of an adult of any species one can approximately guess its habits. Thus many of the cetacea have developed huge proportions (*e.g.*, the sperm whale), because the water in which they live adequately supports the weight of a huge frame. On the other hand, animals whose *avoirdupois* must not exceed the strength of the boughs about which they climb are never of excessive size : monkeys and sloths for example. Even the gorilla and orang outang are relatively small as compared with elephants and rhinoceroses. Again, beasts inhabiting mountains (chamois, hyrax, Cape zebra) attain but comparatively small dimensions ; for large animals (indeed those with broad feet merely) would be unable to secure any hold on the edges of beetling precipices. Lastly, island forms are of small size, especially if restricted to a very limited distributional area : example, the Antarctic wolf.

The Antarctic wolf (*Canis antarcticus*) is now wholly exterminated. It inhabited the South Falkland Islands in the South Atlantic, stood about 15 inches at the shoulder, and in general outlines resembled a small coyote or prairie wolf. From the

nose to the root of the tail it measured 36 inches : the tail itself was 13 inches long. The fur was of a reddish or yellowish colour, suffused with black above and paling to whitish below ; the sides of the neck near the ears were rich fulvous and the legs also were uniformly if less distinctly of this hue. The tail at the base was coloured like the body, becoming black in the middle and white at the tip. Although from its small size the *Canis antarcticus* resembled a fox it was a true wolf, as indicated not only by its sturdy build and the moderate proportions of its tail, but also by the convexity of the posterior margin of the orbit in the dried skull : foxes are of slighter proportions, have ample brushes, and the hinder border of the orbit is concave.

The early history of the Falkland wolf is imperfectly known ; the first record of its existence appears to be that of Strong's men, who landed on the islands in January, 1690, and took there by means of greyhounds, a young "fox" which they succeeded in keeping alive on board ship for several months.¹ Dom Pernety "Histoire d'un voyage aux Isles Maloaines" (Falkland) mentions having met with these animals in 1763-64. Commodore Byron, of H.M.S. "Dolphin," visited the Falklands in Jan-

¹ Several well-known naturalists have erroneously stated that Dom Pernety was the original discoverer of this wolf. Strong, however, anticipated him by three-quarters of a century. The "foxes" which Strong found on the Falklands "twice as big as those in England" were evidently the *Canis antarcticus* and no other species. Other observers have similarly compared these animals to very large foxes.

uary, 1765, to take possession in the name of George III., and brought home a wolf which was described by Pennant. An amusing instance of the fearless curiosity of these beasts occurred when Byron's party attempted to land, for four of the animals ran belly deep into the sea to stare at the sailors, who took their tameness for ferocity and, being unarmed, pulled back to the ship! On a later occasion, Byron's men having fired the grass, great numbers of wolves were seen running away from the flames. These beasts, unmolested by man, existed in great numbers, preying on the rookeries of penguin and on the geese which frequented the kelp-strewn shore; some observers have also found seals mangled by them.

The Antarctic wolf was generally silent, though occasionally uttering a feeble yapping bark; went single rather than in packs; lived in burrows in the sandhills; and was altogether a strange anomaly—being a wolf which adopted the habits of a fox. Not only was this animal itself aberrant, but it caused other species to become so; the upland geese for instance which inhabited the islands took to nesting on isolated rocks for safety, just as the Samoan *didunculus* pigeon has taken to trees to avoid the imported cats. Tame enough in the day-time, like many island forms, at dusk the geese became very wild and shy: Captain Fitzroy was doubtless right in attributing this altered behaviour

to fear of the prowling wolves. If report be true, the geese had but too much reason for fear : since it is said that the wolves themselves had been originally turned out on the Falklands by the Spaniards, to consume all supplies and thus prevent other nations from anchoring on the islands ! Thus left to their own devices, the wolves had attacked and almost exterminated a small native fox, and had taken possession of its burrows. True foxes are unknown in South America : Col. Hamilton Smith, in writing of the culpeo or Magellanic "fox" (*Canis magellanicus*), has, however, remarked "we do not know if it is this species which is stated to exist also on the Falklands and to have been nearly extirpated by the larger *Dusicyon* (i.e., *Canis*) *antarcticus*." The culpeo still occurs in Tierra del Fuego and may really have once inhabited the Falklands : it is a smaller species than the Antarctic wolf, which Capt. Fitzroy has stated to have been "twice as bulky as an English fox, and twice as high on the legs." Moreover, in its latter days the *Canis antarcticus* turned a confirmed sheep-worrier ; so that it would not have been likely to show much mercy to weaker animals, even of its own kind. Be this as it may, no trace remains of the small native fox of the Falklands ; perhaps it never existed. As for seizing the burrows of their victims, the wolves are just as likely to have constructed them themselves, as their nearest living ally, the coyote or prairie-wolf does to

this day : the sand dunes being selected because they afforded the only dry site in that dismal expanse of moorland and sodden, saturated peat bog. The burrows intercommunicated, so that the wolves were more sociable than was formerly supposed. It is, however, incorrect to instance these animals (as has recently been done) as unique among the canine race in their under-ground colonies : for the African wild dogs also live socially in the subterranean fastnesses of the ant bear. Thus far the habits of the Antarctic wolf : here follows the history of its decline and eventual extermination.

In March, 1764, Bougainville endeavoured to colonise the Falklands for France. Three years later they were ceded to Spain, who presently tired of them in her turn ; Great Britain meanwhile exerting a more or less nominal authority over them. For ten years at least (1810-20) the Falklands " minded themselves." In 1817-20, the French corvettes "*L'Uranie*" and "*La Physicienne*," under M. Freycinet, were lost on the Falklands. Owing to lack of provisions the starving crew were compelled to attack the rookeries of penguins, so that MM. Quoy and Gaimard, the ship surgeons, had but too much opportunity of noting the presence of the bird-hunting wolves. Freycinet, jealous of the honours bestowed on naturalists of former expeditions, had refused to take any with him ; therefore so much the greater credit is due to the doctors for

the zoological observations which they published on their return. The feral descendants of the wild horses which the French had in 1864-67 liberated on the islands multiplied rapidly—rough dun-coloured brutes, which if required for breaking-in had to be pursued and lassoed like veritable beasts of the chase. In 1834 there were said to be at least 4,000 of them, besides some 12,000 cattle. From the mainland there came Gauchos, Spanish rough riders, who hunted the wild horses and cattle. They settled on the Falklands; the advent of these men heralded the beginning of the end of the Antarctic wolf.

Had the wolves limited their depredations to attacks on the penguins whose skins littered the mouths of their burrows, to the wild geese, the sea fowl, and the seals, perhaps the colonists might have spared them; there was no lack of food, for the sea-birds swarmed in such numbers that as late as 1821 eight men in about five days collected over 60,000 eggs! But the insatiable curiosity which had in earlier times alarmed the crew of the "Dolphin" now prompted them to steal meat from the Gauchos. Numbers were killed in retaliation, for with a strange supineness unlooked for in beasts so nearly related to foxes the wolves allowed themselves to be approached and stabbed in open daylight. In 1836 they had already become extinct in the eastern portion of East Falkland. *Facile decensus Averni;* from this

time the wolves, already fewer in numbers, progressed rapidly downhill.

About 1839 the hunters employed by Mr. G. Astor, a fur dealer in New York, made a descent on the Falklands with woeful results to the wolves. So assiduously did they slay that they were said to have almost exterminated them: the total disappearance of the species from East Falkland, which apparently occurred at this time, may have been due to these men. A great number of pelts brought to New York were seen by Col. Hamilton Smith, the well-known naturalist, in Mr. Astor's store. This, then, was the second act of the drama.

Third act. The islands now became definitely colonised, while the Gauchos were replaced by keen-witted Scotchmen who engaged actively in stock-farming, undeterred by the driving hailstorms and violent winds of this desolate region. Although in those early days it cost £2 to land each sheep, a considerable farming industry was presently established. The new colonists had, so to speak, "no use" for the Antarctic wolf. It was practically crowded out; for it developed a fatal taste for mutton. Two or three of the wolves would round up a flock, and dashing into it, kill their victims by biting them in the back of the neck. These expensive tastes were discouraged by the farmers, who destroyed the wolves by placing dead geese doctored with strychnine in their burrows. When

Mr. H. Byng wrote to the Zoological Society in 1870, he stated that the wolves were almost exterminated. In 1876 the Challenger expedition visited the Falklands, but Professor Moseley, a well-informed and enthusiastic naturalist, in his account of the visit, makes no mention of the native wolf. Indeed, this interesting species was exterminated in that year, the last survivor being killed at Shallow Bay, West Falkland. A final relic of the vanished race was secured in the form of a skull which Mr. E. A. Holmsted found on West Falkland about this time, and presented to the Royal College of Surgeons' Museum. So utterly was the Antarctic wolf destroyed that in 1904 Mr. Rupert Vallentin was unable to find their very burrows.

It is almost pathetic to notice that when a species has passed for ever from the earth reports of its continued existence continue to reach the press of Europe. The case of the true quagga of South Africa is an apt illustration of this:¹ so also is the Antarctic wolf, since in 1904 a gentleman writing to *The Field* stated that the animal was not extinct, since it occurred abundantly in Tierra del Fuego, where over three hundred had been recently killed on a single run because they worried the sheep. These "wolves" were however probably referable to the culpeo or Magellanic fox, a well-known species

¹ Renshaw; "Natural History Essays," p. 179. The true quagga was exterminated in South Africa about the same time as the Antarctic wolf in the Falklands.

with a wide distributional area and in little danger of extermination ; in view of its relationship to the *C. antarcticus* its sheep-killing propensities are very interesting.

Post cineres gloria sera venit. In view of its utter extinction, now beyond a doubt accomplished, all specimens of the Antarctic wolf have a melancholy *post mortem* interest. The following examples have been obtained :—

1. Young individual (sex unknown) taken in 1690 by Strong's men. Had this animal been preserved it would have been interesting as the "type" specimen.¹ Unfortunately, being terrified several months afterwards at the firing of the vessel's big guns (discharged for the first time since its capture), it jumped overboard and was lost.
- 2, 3. Two examples, examined by Buffon, probably brought home by Bougainville in 1769. Buffon did not recognise the value of the specimens, dismissing them as reddish examples of the common fox : but Bougainville seems to have noted their wolf-like appearance, for he well styled the species "loup-renard."
4. Specimen brought home by Commodore Byron and described in 1792 by Pennant in his "History of Quadrupeds."

¹ It might, for example, have been preserved in the Ashmolean Museum then maintained at Oxford : the British Museum of course was not founded till 1753.

5, 6, 7, 8. Four examples brought home by Capt. Fitzroy, R.N., and Sir Wm. Burnet in 1836. Two of these (one if not both being from East Falkland) were presented to the British Museum by their joint owners, and the East Falkland specimen will be found figured in Mivart's "Monograph of the Canidae." One of these was delineated in 1839 by Waterhouse in his "Zoology of the Voyage of the Beagle." The short tail contrasts sharply with the ampler brush of the *Canis magellanicus*, also figured.

9. Skull in Royal College of Surgeons' Museum, presented by Admiral Sir Francis Beaufort.

10. An adult specimen brought home by Ross in 1843 is now in the Leyden Museum. This collection also contains (11) an adult female obtained—so it is said—from "South America." "Par M. Frank en livrée de passage."

12. Specimen received alive and exhibited in the London Zoological Gardens in 1845. Probably the first living example ever seen in Europe.

13. Adult female and skull obtained in 1863 by Capt. Abbot's expedition: now at Leyden.

14, 15. A pair of Antarctic wolves were obtained alive in 1867-8 by Lecomte, who had been sent to the Falklands to collect sea-lions and other animals for the London Zoological Gardens. Having spent some months on the islands, Lecomte left for Monte Video in the "Fawn" with a great collection of

penguins, cormorants, starlings, &c., also four sea-lions and the two wolves. The weather was very bad between Port Stanley and Monte Video; and the "Fawn" making a very stormy passage, no less than seventy-one animals were lost in crossing. Arrived at the mainland, Lecomte embarked on the homeward bound steamer with the wreck of his collection. Alas! his troubles were not over; he arrived home shorn of nearly all the results of his long and industrious labours. Like Aeneas, he had "suffered more than his fate," for some half dozen specimens alone remained. One of the Falkland wolves had perished on the journey; the survivor was installed at the Gardens on August 24th, 1868.

16, 17. Two years after Lecomte's ill-fated expedition Mr. H. Byng obtained a pair of these wolves and sent them off to London; the male died *en route*, but the female was received at the Zoo on November 8th, 1870. This and the preceding ones are the only attempts made to send this species alive to England, or indeed to Europe as far as the present writer is aware. The hyoid bone of one of the Zoo specimens, purchased from Mr. Gerrard in 1870, is now in the Royal College of Surgeons' Museum.

18. The skeleton of an Antarctic wolf, presented by the authorities of Haslar Hospital, is now in the National Collection.

19. The skull of this species found by Mr.

Holmsted in 1876 is now in the Royal College of Surgeons' Museum.

With the enumeration of the foregoing census one might well close this account of the Falkland wolf; but since it is extremely singular that so large an animal as the present species should inhabit so restricted an area, it would be interesting to inquire whether it was introduced into the islands by man or other agency; and, if so, whence it originally came. The legend that the wolves were brought over by the Spaniards cannot be proved or disproved at this time of day; it is possible, however, that the *Canis antarcticus*, like so many island species, gained its secluded home transported on driftwood. Strong ocean currents, setting towards the Falklands, continually pile the dreary coast with lumber; the very seaweed, torn up by storms, floats in huge detached masses which, encumbering the shore, constitute a very real danger to mariners endeavouring to land. Darwin has stated that there are few places between Cape Orford and Choisel Bay where a good supply of firewood cannot be obtained; timber thus transported from Tierra del Fuego to the Falklands might easily float over any small beast, just as tigers in India have been helplessly borne along on uprooted trees during a deluge. Tennyson makes Lynette say to Gareth:—

Lion and stoat have isled together, fool,
In time of flood;

and one can well imagine that one or two stray wolves might take involuntary passage by this natural ferry. A few specimens introduced at chance intervals would find the penguins and steamer ducks an abundant and defenceless prey; free from molestation by man, and enjoying ample supplies of food, the wolves would soon increase in numbers.

This brings us to the crux of this Essay. Granting that the wolves had thus been ferried over to the Falklands, should the *Canis antarcticus* be considered as a species distinct in itself? or as a variety of some other animal modified by long isolation from its original habitat? And if the latter, from which species is it derived? Old Molina, who in 1776 published his "Compendio de la Historia de Reyno de Chile," had no hesitation in declaring the Falkland Island wolf to be identical with the culpeo (*Canis magellanicus*) of the mainland. As regards *mental* characters one certainly recognises considerable resemblance between the culpeos which on several occasions having to come to stare at Molina in the woods would then depart: and the Falkland wolves which from their very tameness and curiosity caused the worthy sailors of H.M.S. "Dolphin" to beat a retreat. Although this curiosity probably forms part of the mental equipment of all these fox-like dogs at least it alone does not negative the origin of the Antarctic wolf from the culpeo. Even the fur of the culpeo assumes in the *southern*

portion of its range that denseness which distinguishes the pelt of the Antarctic wolf; hence on Molina's theory we see in the southern culpeo a Falkland wolf in the making. The typical *magellanicus* is certainly greyer and smaller than the *Canis antarcticus* and the tail is tipped with black instead of white: but other South American *Canidæ* exhibit a variation quite as remarkable. The crab-eating *C. crancrivorus* varies both in colour (grayer or redder) and in size: an example which died in the Zoological Gardens in 1879 was regarded as an aberrant *cancrivorus* by Professor Mivart, as a distinct species (*C. rufus*) by Dr. Günther. Azara's dog (*Canis azarae*) is known in at least two phases, one (*Var patagonicus*) being pale-coated, while the other (*Var fulvipes*) is of a dark hue. *Canis parvidens* is yellowish grey: *C. microtis* is iron-grey. The striped-tailed dog (*C. urostictus*) seems to combine in its fur a mixed assortment of all the colours sported by its congeners, being of a rufous ochre tint washed with black and white, and bearing in the middle two-fifths of its grey tail a dorsal line of sable which recalls the black tip seen in the culpeo. Indeed it is difficult to say where one species ends and another begins, and one might well hesitate to pronounce an *ex cathedra* statement on the zoological status of the Antarctic wolf. The late Dr. J. E. Gray ranked the Falkland species as a fox-like dog, placing it amongst the other lesser *Canidæ* just

mentioned ; the late Dr. Mivart, however, did not associate it very closely with the Magellanic "fox," though inclined to consider the South American Canidæ as forming a natural succession of true species, a living link between culpeo and Antarctic wolf. Huxley went a step further, for, having separated the *Canidæ* into two sections according to their anatomical characters, he showed that the teeth and skull of the Falkland animal indicated considerable affinity with the true wolves. In accordance therefore with this view the *Canis antarcticus* ranks as a form separate from though related to its congeners.¹

Pennant may not have been so far wrong when he said of the *C. antarcticus*, "it may be a wolf degenerated by climate," though he doubtless referred to the wolves of the *Old* World as possible ancestors. The naturalist, in substituting the term "modified" for "degenerated," will in spirit subscribe to the suggestion of Pennant. The *antarcticus* is indeed remarkably like a small coyote or prairie wolf; perhaps some may be inclined to rank it as an insular race of that species. The prairie wolf inhabits Central as well as North America, so that if the *antarcticus* was really introduced by the Spaniards they might easily have obtained it from

¹ It may here be mentioned that the culpeo shows much *external* resemblance to Azara's dog. A dark-coloured specimen of each is to be seen in the Natural History Museum at South Kensington. Being placed side by side the resemblance is striking. The *antarcticus* in the collection is not at all like the culpeo in the same series.

their own territory. Those inclined to consider the Falkland wolf as a degenerated coyote might find support from the case of the Virginian "fox," southern examples of which are notably smaller than their northern brethren. It is, however, a far cry from Costa Rica to the Falklands, and the Spaniards, a careless race whose motto is ever *manāna* (to-morrow), would be little likely to trouble themselves to transport any save useful animals for long distances. Again, one requires a long series of *osteological* specimens—skulls and teeth—on which to base an opinion as to the validity, or otherwise, of a species. It is this very dearth of material which yet hinders the study of the lesser *Canidæ*; for variation amongst individuals of the same species shows itself in internal structure as well as externally in the colours of the fur. Briefly, the Antarctic wolf in its appearance and habits, in its history and affinities, was a most interesting beast; and in vanishing for ever it has fulfilled the sagacious prediction of Darwin :—“ Before the paper is decayed on which this animal has been figured, it will be ranked amongst those species which have perished from the face of the earth.”

THE HYÆNA DOG.

"A kind of wild dogs, which were here called jackalls, and are the same as Samson's foxes, mentioned in Scripture, frequented these plains in large troops. They caught a great number of the wild goats (or antelopes) that abound here as well as of ostriches, in the hunting of which they set up a regular cry, surrounding the game first at a distance and approaching nearer to it by degrees. They likewise committed great havoc amongst the farmers' sheep, unless these were carefully guarded by shepherds furnished with firearms."

Thunberg's Travels, ii, p. 10.

Strong, active, blood-thirsty and daring, few beasts of prey are so deservedly dreaded as the savage hounds so graphically described by Thunberg: for in spite of the good man's assertions these "jackalls" are by no means the same as Samson's foxes, but in their organised method of hunting and in their sheep-worrying proclivities are clearly identical with the Cape hunting-dog (or hyæna dog), a brute well known both for its ferocious temper and for its cunning in the chase. True jackals are far too small to pull down ostriches or even largish antelopes: the wild dog on the contrary has the stature of a tall greyhound and will readily overcome quarry three times its own size.¹

¹ The mistake has reurred again and again. In Vol. IX. of the "Boys' Own Annual" a fine picture of a gemsbok and some unmistakable hunting-dogs is entitled "Gemsbok and Jackals." The "jackals" of Count Potocki's Somaliland trip appear to have been wild dogs, while the "hyænas" described in Baldwin's "African Hunting" as running down and devouring an inyala antelope likewise seem to have been hyæna dogs.

The Cape hunting-dog (*Lycaon pictus*)—wilde honde of the Boers, matshabidi of the Basutos, manoab of the Arabs—stands about twenty-seven inches high at the shoulder, and measures about four feet and a half from the tip of the snout to the end of the twelve-inch tail. The muzzle is short and squarish; the head broad and flat, with wide ears, which are as neatly rounded as if cropped with scissors. The legs are long, and the feet are remarkable for bearing but four toes apiece; the tail carries a small brush. In sharp contrast to the crisp coat of the hunting leopard above mentioned, the fur of the hyæna dog is remarkable for its woolly texture, being quite devoid of long hairs. The curious appearance of the wild hound is heightened by its coloration, which consists of a varying mixture of ochraceous grey, black, and white. No two are alike, neither does the pattern correspond on both sides of the same animal, in which circumstance the wild dog resembles the ocelot tiger-cat of America.¹ There is usually (by no means always) a black line—the *linea faciem percurrens* of Burchell—running from between the eyes backwards over the neck. Most individuals have the terminal half of the tail white, though this

¹ This remarkable individual variation of the Cape hunting-dog seems utterly unknown to most illustrators of natural history books. Even in the best of these one may see a pack of hounds portrayed as hunting an antelope, each animal being an exact replica of its fellows, as if all had been drawn from a single skin! Sir Cornwallis Harris, a practical naturalist, does not make this error. In his "Portraits of the Game and Wild Animals of Southern Africa" will be found delineated a small pack of differently coloured individuals.

is not always the case, as erroneously stated in natural history books. Mr. F. V. Kirby records an example with a buff-tipped brush, which he shot in Central Africa.

Strangely differentiated from all the rest of the canine tribe by its brilliant coloration, the hunting-dog superficially resembles the spotted hyæna of the same localities; hence it was originally classed as a hyæna by the older naturalists, while some (like Griffith in 1827) called it the "hyæna-dog." It is difficult to explain the bizarre marbling of the fur, though perhaps its patchwork coat renders the animal less conspicuous when hunting by moonlight than a uniformly-coloured livery would do. The white-tipped tail probably acts as a semaphore, which by its continual wagging keeps the pack together, so that all may benefit by the varied talents of its component members. At least it is recorded that when game is discovered the pack run mute with sterns down; no need for wireless telegraphy with the prospect of a meal ahead! Whether the ochreous hue renders inconspicuous those individuals which possess it is not ascertained; but it should be remembered in this connection that the reddish bush-dogs of the Malay thickets are said to be difficult to distinguish in the twilight.

The extraordinary appearance of the Cape dog rendered it a fair puzzle to the early naturalists. The chaus of Pliny "*effigie lupi, pardorum maculis*"

which was gregarious, not solitary, and preyed on asses for preference—though when pressed by hunger it ate corn and dourra—appears to have been a true hyæna; but the “Jackals of Commany and Aquambo” which Bosman mentions as taller than sheep, with large flat heads and spotted coats, and able to spring on high walls, appear to have been hunting-dogs. Burchell, who brought home a living male specimen (presented to him by Mr. Hesse), called it “a new and distinct species of hyæna”; probably from this remark he has been wrongly credited with being the discoverer of the species. As we have seen, Bosman about 1704 noted it in West Africa; Thunberg in 1770-75 also observed the wild dog, though he did not recognise it as distinct from “Samson’s foxes.” In 1814-15 a skin from West Africa was exhibited in Riddell’s Museum; shortly afterwards another specimen living in Exeter ‘Change was figured from life by Mr. Howitt. This latter animal may have been the same that was subsequently preserved in Bullock’s Museum; if so it was the “type” specimen, since the individual figured by Temminck (the first describer of the species) was purchased by him at the sale of that famous collection. Temminck in 1820 ranked the hunting dog with the hyænas, after a careful study of the one which he purchased in London and figured in the *Ann. Gen. Sci. Phys.*, III. (p. 54, t. 35). Col. Hamilton Smith first recognised the true position of

the new animal, having frequently seen Burchell's specimen while it was alive. He communicated his views to Mr. Joshua Brookes, whose splendid collection in Blenheim Street, off Great Marlborough Street, was only second to that of the Royal College of Surgeons. Mr. Brookes being convinced subsequently took Burchell into his well-filled museum, and by a direct comparison of the skeletons of a domestic dog, the hyæna dog and a true hyæna, emphasised the osteological characters of the wild hound. *Hyæna pictus* of Temminck became *Lycaon pictus* of Brookes. Temminck himself was afterwards (1829) disposed to rank it as a dog. It is unfortunate that the apt name of *Lycaon tricolor*, used by Griffith in his edition of Cuvier's Animal Kingdom, can only be regarded as a synonym, being antedated by two former titles.¹

Distributed nearly all over Africa, south and east of the Sahara Desert, the Cape hunting-dog may be considered the scourge alike of veldt and bush-country, of desert and scrub-jungle. The dominant note in its character is a formidable mixture of craft and boldness, joined to a persevering blood-thirstiness little short of appalling. Combined in

¹ Col. Hamilton Smith's views do not seem to have met with the immediate acceptance which they deserved. In M. Deleuze's account of the Paris Museum, published in 1823, we read that the collection included the newly-discovered *Hyæna picta*. Delegorgue's term "cynhyène" aptly expresses the status of the wild dog. By the way, the term "hyæna dog" was applied by Swainson to the aard wolf, which, from its stripes, resembles a diminutive striped hyæna. Both spotted and striped hyænas have thus more or less faithful "doubles," recalling the case of the clouded tiger and the marbled cat.

well-drilled packs of from ten to thirty or even sixty individuals, these terrible hounds attack practically any four-footed thing they can overpower, drawing cover after cover with the persistence of trained beagles. As related by Thunberg, they show almost human intelligence in endeavouring to encircle their quarry. The hounds run mute on scent, their close packed ranks captained by successive leaders as the foremost dogs grow weary, and whipped in by enthusiastic comrades. Gemsbok and sable, blue wildebeest and waterbuck, in spite of their size and strength, are hunted by these self-trained Nimrods, whose long unswerving gallop patters mercilessly over the veldt; the game being weakened by a series of quick snapping bites till it stands exhausted at bay. It is then pulled down, despatched and devoured with ghastly rapidity. These dogs do not limit themselves to wild-killed prey : they ravage the flocks of the Cape farmers, and though now much diminished in the Colony still constitute a serious factor in the annual tale of losses.¹ It is said that a pack of wild dogs once inside a sheep fold will not leave till they have killed every one. *Uno avulso, non deficit alter.* The hounds will slay sixty or seventy in a night, and by dawn be twenty miles off; being as elusive and migratory as the famous De Wet. Nor do they limit their operations to

¹ Hunting dogs still remain in the Addo and Fish River Bush. In Thunberg's time they even infested the flats between the bays of Saldahna and St. Helena in Western Cape Colony.

night time. Bold as the boldest wolves, they will drive off prey from within a hundred yards of a house, run into it and pull it down before a horse can be saddled in pursuit ; a quarter of an hour later nothing is left but bones.¹ Thomas Pringle, the South African poet, relates how a pack of wild dogs once chased a hartebeest antelope right across his garden and orchard. Lively times indeed !

Sir Cornwallis Harris, in his book of portraits of South African animals—now quite a rare work—has figured an interesting picture of wild life. The scene is laid at the foot of a low rocky hill. Above, in the clear azure, float countless vultures, descending like black ghouls upon a carcase which, already rent in pieces, lies in the midst of a struggling gorging company, composed of more vultures and two species of hyæna. Various individual feasters are tearing at detached portions of the banquet, and in the foreground two vultures struggle for the same piece of carrion. Close by are seen five hunting-dogs, apparently from their nonchalant attitudes comfortably full-fed ; of this small pack two are sitting on their haunches, and a third is reclining as if for purposes of digestion. It does not appear that

¹ When Delegorgue was in Africa he heard a terrible story regarding the hyæna dog. A hunter having wounded an eland antelope was slowly following it a distance of 2,000 paces, when a pack of forty wild dogs appeared and gave chase to the quarry. The hunter hastily rode up and dispersed them, but to his amazement on reaching the spot where the eland had been, only bones were left ! Determined on revenge, he at once pursued the dogs. Full fed after their heavy meal, they began disgorging great pieces of hastily-bolted meat, the ground for a distance of many paces being littered with these ghastly reliques.

the wild hounds have in this case actually run down their prey. A more probable agent appears in the mounted sportsman seen hunting zebras in the adjacent plain : a wounded beast has already according to custom turned out of the herd. Such a vividly realistic picture is worth hundreds of mere home-made book-illustrations.

Even to man the hunting-dog pays but scant respect. It is the habit of these animals to bask in the sun in the remoter scrub jungles, or to lie among the long grass on hill sides. A man stumbling unawares upon such a grim company gladly retreats as the bush suddenly swarms with savage brindled heads. Those which Gordon Cumming dispersed on a celebrated occasion retreated but slowly, "barking like collies." "I very frequently disturbed them feasting upon the quarry which had rewarded their industry," says Harris, "on such occasions they were wont to retire sulking to a little distance and squatting on their hams, to utter a petulant growl, which ended in a suppressed bark." Sometimes, doubtless, they do not retreat at all; they have even treed unarmed men. Thus Mahlé, one of Delegorgue's Kaffir gunners, thoughtlessly wounded a wild dog and had to run for it; the wounded animal was backed up by five or six sympathisers, and the Kaffir had barely time to climb a tree. Two lay close at hand, and others kept wandering about at some distance; the dogs kept him pinned there for two

hours! In Nubia, where these hounds subsist by hunting gazelles, they have, according to Dr. Rüppell, attacked human beings; mounted wayfarers are said, however, to be safe. Some two years ago (say 1903) a white man on the march in the North-East Transvaal had his pack donkeys attacked by wild hounds, which he only beat off after much expenditure of ammunition. Few sensations could be more unpleasantly thrilling than those of a traveller pursued by these dogs, recalling in his own unfortunate person Tennyson's Sir Tristram, who

Last in a roky hollow, belling, heard
The hounds of Mark, and felt the goodly hounds
Yelp at his heart.

Truly the ferocious blood-thirstiness and truculent ferocity of the Cape hunting-dog presents "Nature red in tooth and claw" in a very terrible aspect.

There is, however, a reverse to the medal. The wild hound has the virtues of its qualities. Its half-human intelligence, its painstaking self-reliance, and its *esprit de corps* render it *pro tanto* interesting and almost attractive. Moreover, when taken very young it will become tame, and might even be employed, like the hunting leopard, to chase game for the benefit of its owner. Dr. Schweinfurth has recorded that at Kurkur, in Central Africa, he saw a tame hunting-dog led by a cord; and Livingstone has stated that the natives habitually train it for this purpose. The wild hounds rest during the daytime

in the burrows of the antbear, which also serve as nurseries for the young. Five to ten, or even twelve puppies are said to be born in a litter, though, perhaps, these larger numbers are the offspring of more than one female. They have frequently been taken (the calibre of the burrows is large enough to admit a man), and young animals are sometimes brought alive to England.

Burchell's specimen was kept chained up in his stable yard for more than a year; though remaining savage towards its attendant it became friendly with a domestic dog, thus abandoning the animosity which normally exists between the bush-pirate and the guardian of the hearth.¹ "It ran with great lightness backwards and forwards, coming boldly towards the spectators," says Colonel Hamilton Smith; it also uttered a whimpering noise, from which the Colonel suggests that the species has received the native name of Mebbia. The domestic dog, by the way, was only just able to reach its brindled companion, being also on chain; had the hyæna dog threatened violence, one step backwards would have placed the other out of danger. The young individual which was living in the Tower in 1828 was not only amiable with a young lion and

¹ A specimen formerly preserved in the Zoological Society's old museum at Bruton Street has been supposed to be the animal brought home by Burchell. Since, however, it is said to have "died in the menagerie" (the Zoological Gardens were not opened till 1826), it is probably the specimen living in the Tower in 1828; being quite young, it might reasonably have lived till 1831, when William IV. presented the Tower collection to the Zoological Gardens.

playful, but would also invite one of its subsequent cagemates (a striped hyæna) to share its gambols. The hyæna was a surly beast, and usually responded by a snarl. Another hunting-dog kept in recent years at the Jardin des Plantes in Paris, and observed by the writer, was very friendly and fond of being noticed. A fourth example presented to the London Zoological Gardens in 1900 frisked about his cage like a huge terrier, and played an absurd romping game with a piece of cloth; unfortunately, the photograph then taken was not clear enough for reproduction in this book.

A pathetic story related of a hunting-dog which lived many years ago in the London collection shows a pleasing trait of character little to be expected in such a bush-pirate as the present species. The animal was one of a pair; the dog, which had been some months in the collection, died convulsed on July 3rd, 1855; since some serum escaped from the skull when under the hands of the taxidermist, death was supposed to have been due to inflammation of the brain. Deprived of her companion, the bitch became inconsolable, and steadfastly refusing to take food pined away, dying on the 13th. She lost in ten days some ten to twelve pounds; no morbid lesion was discovered, and she thus died of a "broken heart." Such intense affection for a partner contrasts sharply with the merciless ferocity which these animals exhibit towards their prey. The weight of

the dog (a young individual) was stated to be fifty pounds.

The Museum of the Royal College of Surgeons contains an interesting relic (No. 522 in catalogue) of the famous hunter, Roualeyn Gordon Cumming. It is the skull of a hunting-dog formerly in the collection which he exhibited at the Chinese Gallery during 1850-55, and is probably that of the individual which he shot on February 16, 1844, in the country between the Vaal and Riet Rivers. This was one of a pack of four which had driven a blue wildebeest into a pool near which Cumming lay ambushed. "The hound got the bullet throught his heart" says Cumming; and since the present skull is uninjured (thus at least not shot through the brain) we may assume it to be identical with that of the specimen obtained on that occasion. It has been very beautifully prepared, the bones shining with an ivory lustre; the occipital crest is not wholly in the median line, but runs forward from left to right. Another interesting exhibit at Lincoln's Inn Fields is the skeleton of a hunting-dog which, presented to the London Zoological Gardens on February 15, 1871, lived for more than four years in the uncertain climate of the metropolis. It is highly creditable that so delicate a beast, used to the open veldt, should have been kept so long in captivity. At Dublin the Cape hound, like the lion, does well, and no less than six litters of puppies were obtained from a pair

that lived in the Gardens for nine years. A figure of three hunting dogs (male, female, and a young one born on November 11th, 1898) appears in the Report of the Royal Zoological Society of Ireland for 1899.

The interest attaching to the hyæna dog in captivity is not limited to its capacity as a mere menagerie exhibit; for there is now abundant evidence of a wish to utilise and not waste the animal riches of Africa. Even the wild hound has been under official consideration; the late Major Wissman suggested some years ago that the station authorities of German East Africa should endeavour to domesticate "hyæna dogs crossed with European breeds." Mongrels between the wild hound and domestic dogs are said, however, to be unsatisfactory; but some have thought that the hunting-dog itself might be useful as a kind of rough and ready foxhound. It would need a brave pioneer to first take the field with such dubious assistance, for, Actæon-like, he might be torn to pieces by his own pack! The training of a hunting leopard or of one of the caracal lynxes used in Persia would be child's play in comparison with the governing of an unruly, blood-thirsty crew of hunting-dogs.

In concluding this Essay it may be stated that in view of the great variability of the present species four distinct local forms are now recognised. Thus the Cape race (Burchell's) is principally buff-yellow with a whitish throat ruff; the Mozambique form is

equally yellow and black with a sable ruff; the East African race is very dark (Mr. S. L. Hinde says that "the greater number of living specimens seen at a distance appear to be black"), save for the white-tipped tail; and the Somali race is of smallish size, the yellow being of a buff-tint—not orange as in the East African form. As already stated, there are also great individual differences amongst these dogs. The following examples may be mentioned:—

1. Young animal figured in Bennett's "Tower Menagerie," p. 77. General body colour stated to be yellowish; has black patches on nape of neck, on outside of foreleg and shoulder, and on thigh and hind leg. Face blackish and a "strong line" passing along the centre of the forehead. Very little white, apparently; but there are white patches on front and inside of forelegs. Cape race.
2. Animal delineated by Harris in his "Portraits of the Game and Wild Animals of Southern Africa," being the foremost of a group of five. General body colour buffish-yellow, irregularly *brindled with black lines* and also patched with open black lituræ, each enclosing a white area. *Linea faciem percurrens* is present; the muzzle, cheeks, and throat are black. Cape race.¹

¹ The "Marbled Lycaon" figured in an English (1886) edition of Cuvier's "Animal Kingdom" closely resembles this individual, being handsomely brindled and also streaked with white. Although the arrangement of the white areas is different, the pose is exactly that figured by Harris, and suggests that it is the same specimen *figured from the opposite side!* the pattern in these animals differing on each side of the body.

3. Specimen figured in Cassells' "Natural History." Very irregular black brindling; *ill-defined pale areas* on neck and centre of body; hind-leg white posteriorly from middle downwards. Terminal half of tail apparently *yellowish*, not white. Since it is labelled "cynhyæna" it may have been one of Delegorgue's specimens, or perhaps the example which Delalande brought home in 1815. A somewhat similar pale specimen is now in the Liverpool Museum. Cape race.

4. Example figured in the Rev. J. G. Wood's "Natural History." A white litura at junction of neck with shoulder and another on the hind quarters. Various white marks without liturae. The black is flecked sparingly over the hide as *small spots*, not as brindling. Facial stripe present; throat-ruff white. Cape race.

5. Example shown in Mivart's "Monograph of the Canidæ": mainly ochreous buff *sparingly flecked with black*. *Hardly any white areas at all*. No facial streak. Cape race.

6. Animal figured in the "Royal Natural History." A very handsome example, with well-proportioned colouring; a good deal of black above and a good deal of white below. Black ruff on throat, and a good deal of black on legs; interfacial line present, tail-tip apparently *yellowish*. Mozambique race.

7, 8, 9. Living animals photographed in the Dublin Zoological Gardens, by Prof. Alfred Scott. The adult pair appear to be pretty equally marked in black and yellow, with some white about the throat. The ruff in both is *almost entirely black*. The young animal seems a pale edition of its parents. All three have facial stripe. Mozambique race?

10. Specimen now living in the New York Zoological Park. Black chiefly confined to under parts, and a good deal of white on front of forelegs (reverse of No. 6). Forefeet below wrists and hind feet below hocks encased in a piebald mitten. Toes black, Burchell's line well marked. Probably of the Somali race.

Others might be quoted, but the above list will suffice, as analysis of the foregoing will well indicate the great instability of the hyæna dog. Small wonder that Sir Andrew Smith supposed that two distinct species of *Lycaon* inhabited South Africa!

THE JAMAICA SEAL.

In these days of universal education, most persons in visiting a zoological garden or museum can imagine the natural surroundings of at least the commoner animals. One pictures, for example, the silvery gibbon of Java shouting in monkey glee as it swings long-armed from bough to bough; the polar bear waching an ice crack for seals as a cat ambushes a hole for mice; the Greenland walruses, white-tusked and blear-eyed, lying in a fighting, biting, roaring mass on the desolate floes; or a herd of zebras leaving a water-hole after drinking, and brushing off the locusts clinging to the reeds as they thunder by in a cloud of dust. To each animal type one assigns a given habitat, the usurpation of which by another would seem a transgression of the harmony of Nature.

Nevertheless, one occasionally finds instances of animals normally occupying distributional areas which to preconceived ideas seem most inappropriate, if not actually unsuited to them. Thus the leopard is as European as the wolf or brown bear, since it occurs on the *northern* side of the Caucasus; the porcupines, a group characteristic of Africa and Asia, are also represented in Italy and Greece; the golden-bellied water-rat—a true rodent—inhabits that marsupial stronghold, Australia. One associates seals with the Arctic and Antarctic regions,

with snow and ice, with the aurora borealis or the aurora australis; nevertheless, the exception proves the rule, and in this case there are two exceptions.

The *Monachus albiventer* is a seal which inhabits the Mediterranean; while the Jamaican or West Indian species inhabits the warm waters of the Caribbean Sea.

The Jamaica seal (*Monachus tropicalis*) measures about ten feet in length. The muzzle is broad, with slit-like nostrils separated by a slight depression and fringed by long flexible whiskers. The vaulted cranium would seem to denote considerable intelligence; the eyes, large and full, are said to be of a crimson hue during life; as in all true seals, there is no external ear. The tongue is bifid at the tip, and the teeth interlock like the jaws of a steel trap. The fore feet alone are provided with true nails, though rudiments persist on the hind ones. The general colour of the West Indian seal is black or ashy grey, and the weight of one which recently died in the New York Aquarium was 360 pounds. Young animals are of a beautiful soft grey colour, deepening into blackish brown on face and limbs; the lower lip, chest, and abdomen are dirty white.

Becoming yearly rarer, if not tending to actual extinction, the Jamaica seal occurs northward off the coast of Florida, westward in the sea between Florida and Yucatan; other limits are:—eastwards, the Bahama Islands, southwards lat. 12° . It is sparingly

distributed over the thousands of reefs and islets which dot the azure waters of the American Mediterranean. These scattered reefs are formed of coral rock, and rise precipitously from a depth of sixteen or more fathoms to a height of twelve or thirteen feet above the surface; in the past they have caused thousands of accidents, strewing the sea with wreckage. To the seals, however, they are ideal retreats, since the very abruptness of these marine precipices ensures, in case of danger, a quick dive into deep water; while, if no harm threaten, the animals can bask for hours together on the white coral sand, alive with the tiny calling crabs that run over its snowy surface. Food is abundant; the Caribbean swarms with valuable fish adapted even for human consumption, as, for instance, the grunts, which, striped with gold on a ground of silver or azure, occur off the coast of Jamaica. The lovely *Chaetodon striatus*, banded with black and yellow; the angel fish, tinted azure blue; the king mullet, livid-spotted on a pink skin; and the yellow-tail, azure above, pearl below, gold band on side, all share the warmth of the Gulf Stream.¹ The closely-locking jaws of the Jamaica seal well serve to hold such slippery prey; but it has been

¹ The angel chaetodon is by no means of angelic habits. In aquariums it has been found to be a sad bully, harrying and even killing weaker fish. At the Island of Sta Catalina, twenty-two miles from the Californian coast, where visitors are taken out to view the sea forests in a glass-bottomed boat, the Pacific seals have been actually observed to feed on yellow-tails (see *Field*, December 10th, 1904).

thought that this species is at least partly a feeder on shellfish, since an old male obtained on the Pedro Reefs by Mr. Wilkie's party had its teeth nearly worn to stumps, as if by grinding up shells. The short-crowned molars of this animal would be well adapted to act as mills.

Like its congeners, the West Indian seal is fond of sunning itself on shore, huddling together for the purpose in placid, grunting groups; individuals will also doze on their backs. When alarmed it makes for the water in a hurried scramble, jerking along in zigzag fashion by alternate action of the flippers until it can tumble into the welcome sea. This seal plays in the water like a retriever puppy, ploughing the surface with its pointed muzzle or paddling about in the shallows. The males fight savagely amongst themselves, and old examples may be obtained with hides as disreputably gashed as that of a patriarchial walrus; they are also noisy, snarling and barking like dogs, and snorting when drawing their heads out of water. Perhaps the dark colour of many of these seals is actually *protective*, instead of the reverse; for though black seals on a white beach would be conspicuous enough, yet should one member of the party become alarmed, his agitated movement would, *because of* his sable hue, soon catch the eye of his companions, and act as a danger signal for the common welfare. It should also be remembered that when Péron landed

on King Island, Bass Straits, on December 10th, 1802, he noticed that the brown colour of the sea elephants caused them to resemble rocks on the beach.

Columbus has long been famous as the discoverer of America; perhaps he should also be styled the discoverer of the West Indian seal, for when in 1494 his flotilla made the West Indies some of these animals were noticed by the party. Between 1494 and 1675 the Spaniards established a regular sealing industry—*mirabile dictu*—in the Tropics. The present species was extensively hunted for its oil on the Alacrane Islands, Englishmen also engaging in this occupation. One of these sealers—Captain Long—had good reason to remember the Alacranes; for his vessel having been stranded in a N. W. gale he was obliged to remain on the islands, contending with a crew of Job's comforters who despaired of saving the ship, though they consented to resume sealing and killed sufficient to fill a cask with oil. The group consists of a series of rocky ledges about four leagues long; voyagers gain the islands by manœuvring through an intricate maze of deep-water channels. Two "New England ketches" ran upon the rocks; Long rendered assistance. The crews of the ketches in return aided him with his own vessel; so with the cask of oil which had cost him so much hardship the plucky captain eventually left for Trist. In 1675 Long's friend, Dampier, visited the Alacranes.

He found the beaches swarming with seals ; but relates that although short of provision he could not get his men to salt seal meat for future needs. Some thirty years afterwards Sir Hans Sloane stated that the seals were so abundant in the West Indies that a hundred were often killed in a day.

The present status of the Jamaica seal is unsatisfactory, and its future appears much more than threatened ; the swarming herds of Sir Hans Sloane's day seem little likely to be seen again. In 1846 Mr. Wilkie's party landed on the Pedro Reefs, a chain of coral rocks about ninety miles long, situated off the southern coast of Jamaica. They found the seals in moderate numbers only, and killed eight of them ; the stomachs were examined, but were found empty. One of the specimens was presented to Mr. Gosse, who gave it to the National Collection ; it long remained the only example in any museum. In 1877-78 an officer of the U. S. coast steamer "Blake," killed several individuals near the Alacrane Islands and on the Isle of Pines, south of Cuba. In 1886 forty seals were taken on the Triangles—three small islands in Campeachy Bay, between Florida and Yucatan—and some, at any rate, of the skins were sent to various museums. The pelt of an adult male, shot on the Triangles by Mr. H. L. Ward, in December, 1886, was sold to Heer Frank, a well-known dealer in Amsterdam ; the next year it was acquired from him for the Leyden Museum.

In captivity the Jamaica seal has always been extremely rare. Mr. Richard Hill, the co-author of "The Birds of Jamaica," had one which lived for four months in good condition, though it obstinately refused to eat. More recently (1897) Captain Martin obtained a female specimen from the Red Snapper Banks, near Yucatan; the animal was acquired for the New York Aquarium, where she was exhibited alive for five-and-a-half years. "Nellie" was tame and playful, and used to splash the visitors with water. She fed well—perhaps too well—for she eventually died of fatty degeneration of the liver and kidneys, probably induced by over-eating and want of exercise; the autopsy also revealed commencing pneumonia in the left lung. Another individual—companion to Nellie—lived two years in the Aquarium.

It but remains to indicate the present outlook of this threatened species. In the first place, the West Indian seal, unfortunately for itself, is of considerable commercial importance—not for its fur, but for its valuable oil. Mr. Hill's animal even after a four months' fast was still sheathed in a casing of blubber four inches deep and yielded four gallons of oil. Now the Caribbean has long attracted numbers of professional hunters who take turtle for the Kingston market and crowd to the reefs to gather sea-fowl's eggs. That such people should for merely sentimental reasons stay their hand from the valuable

black seals is not to be expected; indeed, these gentry will on occasion do a little amateur sealing, like the fishing party that exploited the Anina Islands during 1877-78. Then again, the sheltered inlets of the kays and islands yield valuable food fish, and hence attract fishermen. Even the Pedro Kays, visited by Mr. Wilkie, were so well known for their animal riches that they had received the Spanish name of *vivero* (warren or fishpond). Captain Martin was on a fishing and trawling excursion to the Red Snapper Bank when he obtained the seal for the New York Aquarium. Lastly, even the mudflats swarm with thousands of holothuria or sea cucumbers, which men harvest in cartloads. There is thus considerable likelihood that the Jamaica seal, unless speedily protected, will become extinct. Already, localities formerly associated with it (the Dog Rock for instance) know it no more. If efficient protection can be given at the eleventh hour—even for selfish commercial purposes—this seal might be saved; the United States Government, already known to favour game preservation and with increased influence in the Caribbean since the Cuban war, might well pass some enactment to protect the goose which lays the golden eggs.

The diminished numbers of the grey whale and the practical extermination of the Pacific walrus truly point a moral if they do not adorn a tale. These beasts instead of inhabiting the pleasant waters of

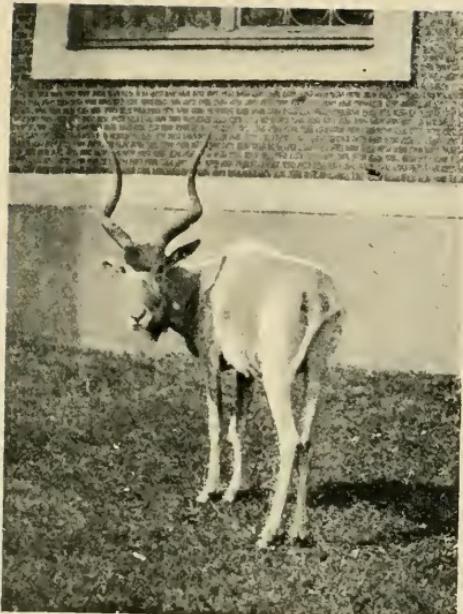
the Gulf Stream, bright with purple sea fans—"the new Riviera" as the tourist advertisements call the West Indies—dwelt in remote and inhospitable regions; yet they have been followed and harpooned almost out of existence. Nay more, the Mediterranean seal of Europe, congener of the Jamaican species, it is now very rare and practically unknown to naturalists. But two examples have been exhibited in the Regent's Park Collection. Of these, the first, presented by M. Yeats Brown, Esq. (British Consul at Genoa), on May 18th, 1882, did not long survive; the second was purchased on April 26th, 1884. Wild examples become yearly rarer. From the Mediterranean species to the Jamaican is but a step, and rarity but a prelude to extinction. Grey whale and Pacific walrus, Mediterranean and Jamaican seal—*Di avertite omen!*

THE ADDAX ANTELOPE.

“Cornua erecta rugarumque ambitu contorta et in laeve fastigium exacuta, ut Lyras diceret”—

Pliny on the Addax; Hist. Nat. Lib. VI., c. 37.

The ancients supposed the unknown parts of the world to be alive with monsters, the cartographers bordering their maps with highly imaginary pictures of these fearful wild fowl. Dog-headed men inhabited the interior of Libya; and the huge roc, half eagle half condor, sailed over the marshes of Madagascar, stooping at all quarry, even man himself. Some of the monsters were wholly legendary and fictitious, but in others naturalists have recognised the distorted likenesses of beasts living on the earth to-day. The dog-headed men were probably Egyptian baboons; the roc was perhaps based on the huge ostrich or epyornis, whose fossilized bones have been dug up in the Mare aux Songes. The *real* animals of Africa known to the ancients are, however, interesting enough; such forms, for instance, as the *leopardus* (cheetah) the *hippotigris* (Grévy's zebra), and the *camelopardalis* (giraffe). Amongst the real beasts mentioned by Pliny was the beautiful addax antelope—*strepsiceros quem Africa addacem appellant.*



ADDAX

in summer coat. Note the handsome spiral horns and the milk-white pelage. A scanty mane decorates the throat; the brown tuft on the forehead remains unaltered at all seasons. August, 1900.

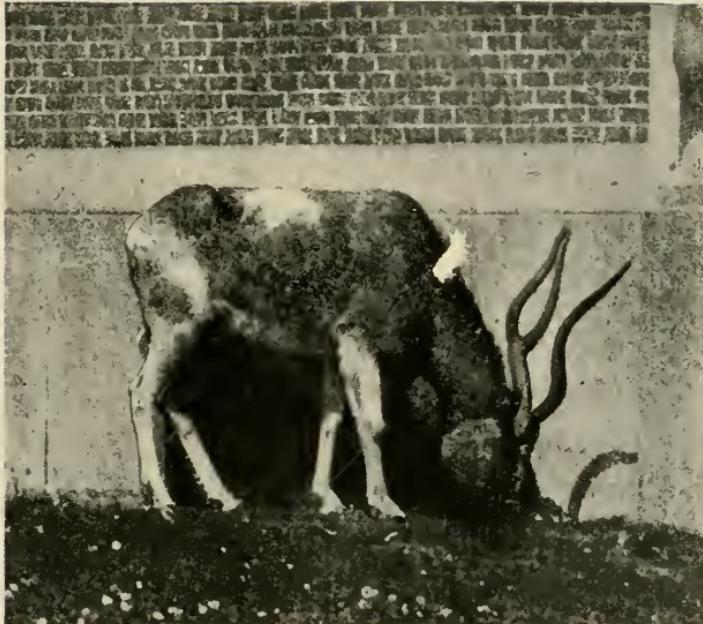
The addax (*Addax nasomaculatus*) stands about thirty-eight inches high at the withers. It is remarkable both for its handsome cylindrical horns, which curve upwards and outwards in an open spiral, and for its greyish-white colour, which recalls the "milk-white hind" of Dryden. The horns when fully grown attain a length of about thirty-five inches over the curve and exhibit two turns of a spiral; a fine example with the commencement of a third turn has been recorded by Sir H. H. Johnston. The head of the addax is of a dark brown colour (paler behind the horns) and the face is crossed just below the eyes by a white chevron, which recalls that of two other African antelopes—Hunter's hartebeest and the Nyasaland gnu. The forehead is ornamented by a thick tuft of hair hanging downward like the fringe of an East End coster "lydy." Young addax are clumsily formed, and at about eight months are as bulky though not so tall as their mothers; calves at this age have the horns represented by longish spikes, and are of a light fawn colour which is more pronounced on the head and neck.

The addax is one of the few African animals which exhibit a seasonal change of colour, due to the alternate casting and renewal of the thick *pelisse* of brown hair which grows on the neck and shoulders in winter. In summer, the hair falls out in patches till almost entirely gone; a specimen examined by the writer in August 1900 retained only a scanty

dun-coloured fringe on the throat.¹ The body colour in summer is also of a less pronounced grey than in winter, being tinged with yellow; the brown tuft of hair on the forehead remains unaltered at all seasons. The addax thus follows the law that in animals of mutable coloration (*e.g.*, Arctic fox, changeable hare) the summer coat is brown or rufous and the winter one grey or white.

Widely distributed throughout the Sahara from Senegal to Kordofan, the northward range of the addax appears to be limited by the Chott Djereed and its sister lakes ; the southward limit is unknown, though Denham and Clapperton presented to the British Museum two ununited horns which they had obtained during their Central African expedition of 1822-24. This antelope was formerly found in Central Tunisia ; its present head-quarters are in the Erg country—a vast tract of the Sahara which continues league after league as a wilderness of rolling sandhills, smooth as glass, almost entirely barren, and utterly desolate and silent. The rare traveller sinks ankle-deep in the yielding surface and may lose his way in the shifting sand ; the route is scantily indicated by mounds of pebbles, or by

¹ Renshaw: *Zoologist*, October, 1902. Six photographs illustrating the seasonal changes of the addax were taken by the present writer a few years ago, of which two were published in the *Zoologist* and two more are reproduced in the present work. The winter coat appears to fall out irregularly, commencing on either side of the spine, and spreading downwards from several centres. The kind reception accorded to the photographs by the Press seems to indicate that the method of dehiscence of the hair had not hitherto been investigated.



ADDAX.

The same individual in winter coat. The animal is clothed with a mantle of coarse hair; note the bare patch on the back, from which the hair has begun to fall off. May, 1900.

bundles of branches torn from the desert scrub. A few Saharan larks, long-billed and grey-coated, may be seen; one or two stray crows or a stray scorpion but add to the sense of dismal desolation. Richardson, who travelled in the dune country in 1845, mentions seeing a white butterfly between Ghadames and Ghat; a most incongruous object, one would think, in that nightmare wilderness of sand.¹

In these remote regions the addax not only lives, but like the gemsbok of the Kalahari keeps in high condition in a practically waterless country. The food supply does not err by its abundance: stunted shrubs like the sheep bush which supports the Karroo springbok, and dwarf acacias (in the more sheltered valleys where the pebbly shingle retains the moisture) offer a plain and scanty fare. As for actual water, the streams of the Sahara are but scanty at best, and no rain may fall for several years. When a shower does occur, it causes a transient vegetation to appear on the sand hills; the addax follow the rains in small herds. Often even the desert lakes are completely dried up in hot seasons, presenting but an enormous surface of brackish earth.

A point requiring elucidation (hereby commended to the notice of naturalists) is whether the addax, like most if not all antelopes, resorts to the desert brack-pans to lick the salt. These "chotts"

¹ The writer was most interested when travelling in the Sahara to the north of the Erg country to observe how the little black and white birds (desert chats) seemed quite at home in the burning wilderness.

occur in Algeria, both in the region of the high plateaux and in the actual Sahara; vast natural depressions, which may be either perfectly dry or swimming with water—in fact, salt lakes.¹ Pans occur in many localities and climates; often thickly covered with a three or four inch layer of coarse salt, they offer in their sparkling surface a natural condiment to man and beast. So fond of it are many animals that it has been recorded that some duiker antelopes kept in captivity without it bit off the heads of some francolin "partridges" in order to obtain the saline blood. On being supplied with salt the antelopes let the francolins alone. The late Emin Pasha used to explain this craving for salt by suggesting that the animals by swallowing it were enabled to rid themselves of internal parasites. At any rate, it is well known that ruminant animals suffer largely from the attacks of various intestinal worms, and the pathological records of various zoological collections show, only too frequently, disastrous results due to the invasion of these puny agents. The *Ascaris megacephala* is a round worm which attacks not only bears and wolves but also horses and zebras, though it is said to be harmless to its involuntary hosts. Be this as it may, Burchell's zebra is certainly injured by some form or other of internal parasite, many having recently been lost on an Uganda zebra farm from

¹ Renshaw: Natural History Essays, pp. 174-175. A photograph of the Chott Tinsilt is also reproduced in the same work.

this cause. Now if the brack of the salt pans contain some natural purgative—say crude magnesium sulphate for example—the strange predilection for “salt” admits of a novel explanation. Of course the salt (sodium chloride) is also taken; but magnesium sulphate being one of the commonest impurities of salt may well exist in sufficient quantity to exert a definite physiological action on the digestive tract.

The Arabs stalk the addax or pursue it on horse-back with the aid of dogs. Their artillery, unreliable and of the gaspipe order, is ably supplemented by the exertions of their beautiful greyhounds—the white silky-coated *sloughis* of the Sahara. The best breed of sloughi comes from Harar, Arbâ, Hamain, and the Ouled-Nail district: the Sheik el Arab, who resides between Biskra and Tugourt, is said to have the best in the world. Tall, swift, and handsome, these graceful hounds are justly prized; even the poorer nomads often possess one or two degenerate specimens, and the present writer has seen them pacing at the heel of their masters beside long strings of swaying camels on the Biskra-Batna road. In spite of these four-footed helpers the pursuit of the addax is an uncertain occupation: large hunting parties absent for weeks may meet with but scanty reward. The very dunes themselves—some 400 feet high—may hide the game. The silvery coat of the quarry also tends to concealment, by harmonising with the shimmer of the heated sand. The wells

are few and far between and may, when reached, be found hopelessly silted up. Then the desert wind or sirocco may rise and drive the sand in stinging blasts over man and beast, perhaps obliterating important landmarks into the bargain; while the feuds between Touareg and Chaamba, and the independent attentions of desert robbers, will induce most Europeans to leave the pursuit of the addax severely alone. The Arabs, indeed, accept commissions to shoot addax for unbelievers. Besides taking the meat for themselves and using the hide for shoe-soles and sandals, wise in their generation they also cut off the horns of their quarry to keep for sale to chance travellers. When at Biskra in 1903, the present writer saw a good pair of horns in a stall in the native market, amongst the jumble of odds and ends with which the Mozabite trader loves to cram his box-like shop. Two other pairs which had been brought in some time previously were also observed. Young addax, born in winter or early in spring, are often taken alive by the hunters, and are disposed of, like the trophies of their seniors, to European purchasers.¹

The addax was known to the early Egyptians under the name of "nu"; they figured it at Beni

¹ A female addax with thirty-six inch horns was shot in 1903 by Lieutenant Hodgson in the Sondan. In 1905 Captain Vaughan of the Egyptian Army, when in Dongola, shot a male addax (horns taped thirty-one inch over the curve) and saw a herd of thirty-seven and other smaller bands.

Hassan, though their delineations are but rude and (save for the spiral horns) scarcely recognisable as portraying the present species. The "ram" figured in a certain inscription (facsimile in the Liverpool Museum) is also strangely like an addax with its ruffed shoulders and curling horns. Some have even asserted that the horns borne by the images of various deities and kings in the temple city of Mendes are those of the addax; the horns being spiral and distinctly annulated. According to Sir Gardner Wilkinson, however, the ram, and not the addax, was associated with the Mendesian figures. One writer even proceeds to draw a parallel between the addax of the Sahara, broad-footed to travel over the sand, and the reindeer of Lapland, broad-footed to travel over the snow, observing that the addax, like the Lapp reindeer, was kept in herds by the early Egyptians—an unlikely story! He adds, moreover, that the leucoryx—always a rare antelope—was also herded by the Egyptians! The "herds" were probably flocks of sheep. Many years ago Dr. Shaw attempted to show that the addax was the pygarg of Deuteronomy.

The modern history of the addax presents quite an orderly sequence of facts and dates, linking up the early years of zoological progress with those of recent times in a manner hardly paralleled for completeness by that of any other antelope. Thus in 1816, de Blainville first described the animal from

an immature female then in Bullock's Museum and afterwards acquired for the National Collection. In 1819, Cuvier observed horns of this species in the Bordeaux Museum. Five years later, Dr. A. W. Otto figured the addax under the name of *Antilope suturosa* from a fresh specimen which had died in a menagerie—probably the first living addax to be imported into Europe. His paper “Ueber eine Neue Antilopenart die *Antilope suturosa*” was published in the twelfth volume of the Proceedings of the Leopoldino-Carolinian Academy. Continuing the chain of facts, in 1827 another specimen was living in the Jardin des Plantes at Paris; while about this time Dr. Rüppell, of Frankfort, was the first European scientist to observe it in its native haunts. He found the addax in Nubia, between Ambukol and Maraza, and a pair obtained by him in this locality are still in the Leyden Museum. “*Cornubus, rugarum ambitu contortis, in laeve fastigium exacutis, lyratis.*” Such was Rüppell's description of the horns. Strange coincidence! he used the same language, almost word for word, as Pliny had employed centuries before! One wonders if the doctor had previously read the Roman writer's *Historia Naturalis*.

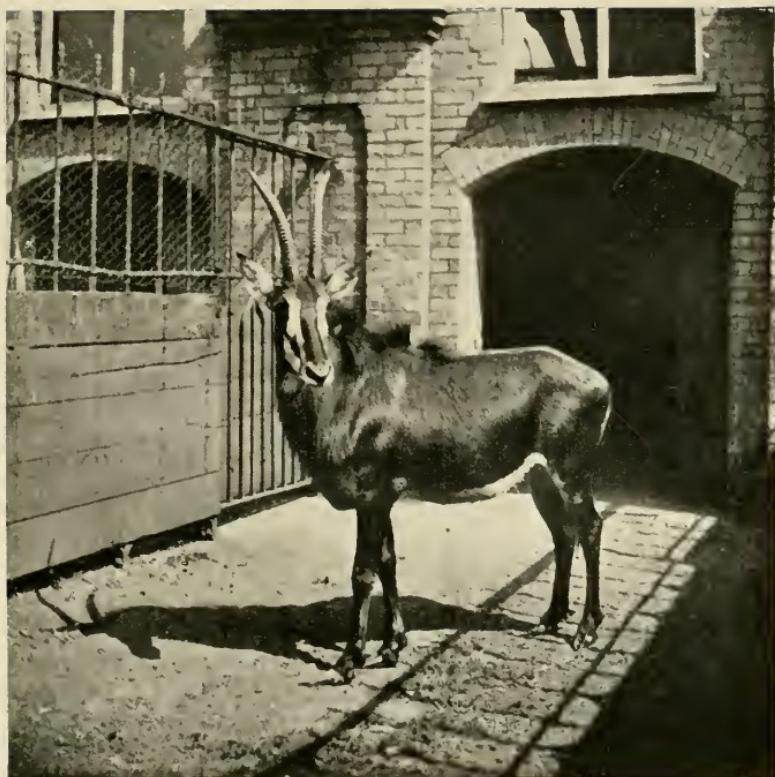
Reverting to menagerie specimens, we find that in 1845 a young addax was born in Lord Derby's menagerie at Knowsley Hall—probably the first ever born in captivity—and was one of the two male

specimens sold by Mr. J. C. Stevens at the break-up of the collection in October, 1851; that in 1849 the Zoological Society exhibited their first addax, and that it was followed by a fine male presented to the Gardens in 1861 by the Governor of Malta, and by specimens purchased in 1864 and 1876 respectively. From this time onwards this antelope began to appear with more or less regularity in the zoological gardens of Europe. In recent years one may mention the two specimens (an adult animal and a younger one) exhibited in 1899 at Berlin; during the same year a pair of addax was presented to the Antwerp Zoological Gardens by Halim Pasha. From A.D. 79 to A.D. 1905; from Pliny to Halim Pasha—such then is the history of the Libyan addax.

THE SABLE ANTELOPE.

Striking in appearance, magnificent in proportions, the handsome sable antelope was the crowning trophy, the *spolia opima* of Sir Cornwallis Harris' famous African expedition of 1836—7. Fitly indeed is the name of the sable antelope associated with that of Harris, as one links that of the clouded tiger with Sir Stamford Raffles. So brilliant and enchanting a narrative of adventure has been left by its discoverer that the account of his journey reads more like a romance than a record of sober fact.

At that time inner South Africa was but little known; diamond mines and company-promoting lay far in the future, and, save for the reports of a few hardy traders and elephant hunters, the country in the region of the tropic of Capricorn was as a sealed book. Instead of being a nursery for millionaires it was a playground for wild beasts, a vast natural zoological park overcrowded with inmates; a paradise for the naturalist, for the sportsman, and for the mercenary hunter after hides and ivory. In Van Riebeck's time (1652) buffalo and elephant, lion and strandwolf had extended to the very seashore; as late as 1731 Kolben described a buffalo hunt near Capetown. Although the game had enormously receded in the long interval that had elapsed, many millions of animals yet remained to ornament that



SABLE ANTELOPE.

The noble carriage of this animal renders it prince amongst antelopes. Note the delicately-formed head and ears, the curved horns, and the whorled neck-mane. The dark, glossy coat, is admirably set off by the snowy under parts. The shadow on the ground curiously suggests the unicorn of heraldry.

dimly known and little explored wilderness, the “far interior.” On the Great Karroo the plains were black with wildebeest and dun with quagga; beyond the Vaal they bloomed with painted zebra and violet blesbok, with ruddy hartebeest and purple sassaby. The deserts of Namaqualand supported gallant troops of gemsbok, their three-foot horns glancing in the sunlight like the lances of a regiment of dragoons. Graceful pallah bounded through the mimosa brakes, or stood at gaze with ears erected like the wings of sylvan butterflies. The shy kudu sheltered in the wait-a-bit thickets; the roan antelope, sturdy and self-reliant, pastured in open day amid the rocky plateaux of the hills. Every saltpan had its wildebeest and springbok, every hillside its duiker and klipspringer. The black rhinoceros browsed on the acacias, harvesting the golden shoots with prehensile lip; its square-mouthed congener cropped the grass of the savannahs, or wallowed like a huge pig in the muddy “fountains.” Swaying troops of elephants climbed the passes of the northern mountains, even to the very skyline, their bulky forms looming black against the blue. Buffaloes wallowed in every marsh, or lay up, drowsy and hideous, in the papyrus brakes; while lion and leopard, cheetah and wild dog took toll of these mighty legions, preying on the feeble and sickly stragglers that fell to their share. Such then was the great natural game park upon which, in the autumn of

1836, there entered that keen-witted and gallant sportsman, that gifted and enthusiastic naturalist—Sir William Cornwallis Harris.

By a happy chance the great expedition which under Sir Andrew Smith had established the existence of the inland lake was just returned from the interior: the Director's Report was read at a meeting held on March 19th, 1836, Sir John Herschell occupying the chair. A splendid zoological collection of 180 skins of new or rare quadrupeds, 3,379 skins of new or rare birds, and a host of other treasures amply testified to the diligence of the party; from these it was proposed to select specimens for exhibition in Europe in aid of the funds. Some of the choicest specimens were stuffed at Capetown by M. Verreaux; amongst these were the roan antelope now in the Natural History Museum, a black rhinoceros, a pair of waterbuck, and a hippopotamus. Harris had many conversations with Sir Andrew; and thus happily supplied with the very latest information set out from Graaf Reinet on September 1st, 1836, the "day so auspicious to sportmen in Europe."

Few expected that the "Indian gentlemen" (Harris and his friend Richardson) would ever return: yet undeterred by the dangers of the way and accompanied only by an untrustworthy following of Hottentot servants, these two pushed stoutly on, eventually reaching Kapain, the kraal of the dreaded Moselikatze, king of the Matabele, having

enjoyed abundant sport by the way. Permission being given to return by the Vaal River route, they eventually reached the Colony safe and sound; one of them, at any rate, being willing enough to repeat the journey. Harris had not been able to reach the mysterious lake which lay to the northward, a feat which he had greatly desired; yet much had been done. A great collection of sporting trophies, comprising specimens of all the South African *feræ*—including many unknown even to the colonists—lay in the waggons; a valuable series of water-colour drawings of animals sketched from life on the veldt had been accumulated, with copious notes: best of all, they had brought back, carefully salted and wrapped in a meal-bag, the magnificent skin of the first sable antelope ever shot by a white hunter—a memorable token of that memorable 15th of December, “the most fortunate day of the whole campaign.”

Harris had met with a small troop of sable—two males and nine females—when on the track of a wounded elephant. Having been delayed in pursuit by the untrustworthiness of his artillery, he eventually followed the spoor over hill and dale, persisting with unquenchable enthusiasm until on the third day he came up with the great bull which had fired his ardour and had even invaded his dreams. Harris wounded him in the hind leg and again in the body: yet the sable not only made off in gallant style but,

brought to bay, lowered his horns and charged. Harris retreated; on the sable standing came up again; and as the great antelope again tilted, toppled him over and killed him. The prize was won. Richardson long remained silent in admiration: Harris made a drawing on the spot and wrote a description there and then with the victim's blood. Then the magnificent trophy was carefully flayed and packed away, the enthusiastic Harris keeping it night and day on his own bed. The long journey south began on the morrow: arrived in Capetown, Harris eagerly inquired for Sir Andrew Smith that he might show him his prize, a treasure hitherto undreamt of by Science, and a worthy rival to the roan antelope already in the South African Museum. Unfortunately Sir Andrew had already sailed for England. The unique specimen was carefully mounted by Verreaux, and was seen by many persons, to whom it was a great novelty. Harris generously presented the sable to the National Collection, sending it to England under the care of Capt. Alexander, himself a naturalist of considerable ability, who had been a member of Sir Andrew's Committee. Harris also sent to Sir A. Smith a description of the new antelope, and posted a letter dated Capetown, October 10th, 1837, in which he gave some interesting particulars of the *Aigoceras niger*¹ to the Zoological Society of London. The

¹ *Aigoceras niger* was the original Latin name of the sable antelope. *Ater* (= jet black) would have better expressed the glossy appearance of this splendid buck: *niger* merely = dull black. *Hippotragus niger* is the scientific term now employed by naturalists.

type specimen was subsequently exhibited at a meeting of the Zoological Society, held on January 9th, 1838. With this abundant preface one may now turn to a careful study of this prince of antelopes.

The sable antelope (*Hippotragus niger*)—zwart wit pens of the Boers—potaquane of the Southern Bechuanas—pala hala of the Swahilis—stands about 46 inches high at the withers. The muzzle is sharp and somewhat slender; a pair of cylindrical horns, heavily annulated for the anterior two-thirds, sweep up from the head, passing backwards to end in a splendid scimitar-like curve. The neck is stout, flat, and surmounted with a whorled upstanding mane which in summer is thick and luxuriant, in winter thin and patchy. The feet are small and pointed: the tail reaches the hocks. Bull sable when adult are rich glossy jet above, snow white beneath: females are of a dark chestnut, which in the regions south of the Zambesi becomes almost black. Both sexes have the face smartly pied. The median area of the face is black: the white cheeks being bisected by a black line, while the muzzle and throat are white.¹ The ears in both sexes are black-tipped, white inside, and chestnut externally. Young calves

¹ The sable antelope, like its roan cousin, is remarkable for a curious brush of white hair which passes downwards and outwards across the face immediately below the eyes. Seen from the side it presents a radiating arrangement of the hair composing it. Although smaller than in the roan antelope, the facial brush of the sable is quite recognisable: yet it has apparently been entirely overlooked by modern artists and naturalists. Harris in his figure of the head of the "blaek antelope" renders it with great skill and minuteness.

are chestnut, the black gradually appearing with age. An instructive exhibit of a sable some few months old is mounted in the Artis Museum at Amsterdam: the horns are but half grown, and the corresponding darkening of the coat normal at this stage is seen saturating the lighter coat of youth. At 14 days the horns are apparent as rounded thimble-like projections: they take several years to grow, the fully adult animal having a distinct space between the lowest annulation and the true base of the horn. The horns of old bulls are more curved than those of cows and immature animals. Average length of sable horns 40 inches; maximum recorded length 49 inches (see Proc. Zool. Soc.).

Distributed throughout South Eastern Africa, north of Swaziland and Delagoa Bay, and especially abundant in Mashonaland, the sable antelope occurs in troops of from ten to thirty individuals, large herds seventy or eighty strong being occasionally encountered. These animals are said to frequent open forest and also well-watered valleys at the foot of rocky, wooded hills. The cows act as sentinels, giving the alarm by a coughing snort; thus signalling to all the herd to stand at gaze with outstretched necks, a group of ebony statues. According to the French naturalist Delegorgue, the sable feeds chiefly at night, up to 9 or 10 p.m. He supposed that in this way its prominent black coat escaped recogni-



SABLE ANTELOPE CALF.

About 14 days old. For figure of roan antelope calf of same age see "Natural History Essays."

nition in the darkness, though one would imagine that so well-armed a beast need fear few enemies. The conspicuous hues of this great antelope may rather be "warning colours," impressing its powerful frame in distinctest detail on the retina of any would-be aggressor. Besides, Gordon Cumming has shown that the sable feeds by daylight also; he records that on October 23rd, 1847, he detected a herd feeding "at an early hour" and found others pasturing at dawn on October 31st. Surely an old buck, black as night and displaying his ample proportions to the utmost by the proud carriage natural to this antelope, would be conspicuous enough when crossing a wide stony valley or standing against a brilliant background of protea scrub as tall as himself. Similarly, a group of sable resting at midday far from cover (their habit when not much hunted) and rolling like horses turned out to grass as the hot red dust drifts over them would be visible far and wide: as also their large and very business-like horns—rusty weapons of defence. When on the move sable file off in a string through the bush: in galloping their arched necks and swinging tails doubtless give them a most spirited appearance. It may here be mentioned that this antelope occurs also in British East and Central Africa, being found in the unhealthy country of the Rabai district; it also occurs in German East Africa, near Tanga.

Harris has left a charming picture of wild life in

his delineation of the sable at home amid "the bonny mountains of Cashan." Scene, a rocky valley sparsely clothed with vegetation. Far in the distance rise the heights of the Magaliesberg, dim blue in the ethereal distance, as if viewed in the haze of early dawn. A herd of swaying elephants, rust-red from their mud bath, leisurely descend from a rocky ledge, browsing as they go; one big fellow loiters to rifle the branches of a parasol-topped acacia. Prominent in the foreground stands a sable bull, sturdy yet beautiful, his noble horns sweeping over his withers in a bold curve and his diminutive fore-feet solidly planted on the hard red earth; in the distance is seen a cow of the same species, walking slowly towards the higher ground, as if about to scale the rocky slope. So excellently is the scene portrayed, that one seems transported to the very spot, expecting every moment to hear the crack of the hunter's rifle.

The spirited writings and clever sketches of Harris soon attracted other sportsmen to South Africa. Hot on his heels if not actually contemporary with him, came Adulphe Delegorgue, a French hunter-naturalist, many of whose trophies now adorn the Paris Museum. He obtained the "*antilope noir*" only after considerable and protracted search, and valued it almost if not quite as much as Harris. So greatly indeed was the sable esteemed, that Tom, one of Delegorgue's servants, having at last obtained

a specimen, sat up all night over the body to prevent it being devoured by wild beasts! A splendid bull, cow, and calf—the first sable ever sent to France—were eventually obtained by Delegorgue and placed in the Museum of the Jardin des Plantes. About this time also Delegorgue's friend, Wahlberg (afterwards killed by an elephant) obtained specimens; a sable bull and two cows, collected by him, are in the Leyden Museum. Other hunters—Gordon Cumming, Baldwin, Selous—have pursued the sable and have found it a sporting beast indeed, standing fiercely at bay and often taking to the water like a hunted stag—slashing out furiously at any dog hardy enough to swim within range of its terrible horns. When about to strike, sable draw in and lower the head and approximate the forefeet; a point usually neglected by artists, who absurdly misrepresent it as conducting a half-hearted defence, with widely separated hoofs. The writer possesses a photo of a menagerie specimen which used to charge the railings of its pen; in two instances snapshots were obtained, showing this typical pose and amply confirming the evidence of field observers. Wounded sable lie down, and striking right and left soon make havoc of a pack of dogs; an instance is recorded where one charged and killed a native hunter by driving a horn into his body.

Apart from molestation by man, the sable is liable to the onslaughts of lion and hunting-dog; old males

which have been driven out of the herd by younger animals being usually attacked. It is said that as in the case of the gemsbok, the remains of sable and lion have been found lying together—

“Side by side those chiefs of pride
Fell down together dead,”

like Mamilius and Herminius in Macaulay’s “Battle of Lake Regillus”. On other occasions the sable has beaten off his enemy. Old antelopes have been shot worn to skin and bone and bearing festering wounds left by the lion’s claws : while conversely Mr. H. L. Duff (“Nyasaland under the Foreign Office,” p. 152) has recorded that some curious scars on the body of a recently shot lion were said by the natives to have been caused by a “Mpalapala” or sable antelope. The following would be an interesting subject for next year’s Academy. Scene: a river bank tangled with buffalo grass ; in middle distance, low hill country, sparsely clothed with thin bush : forest in background, with one or two larger trees already festooned with roosting vultures. In the foreground a sable antelope ; feet approximated, head poised lithe on one side, huge curved horns ready to strike with lightning rapidity. On the red earth crouches a lion, every muscle tense as with snarling lip and quivering tail he debates the chances of a sudden rush. Above, a sunset sky murky with rain-clouds : underneath, the title “Equals !”

From its splendid appearance and noble dignified carriage the sable antelope is always a desirable addition to a zoological garden. The calves are born in August, September, and October: ridden down by a well-mounted hunter they are frequently taken alive, and having learnt to suck milk from a bottle, become interesting though inquisitive pets. The young bull that used to frequent the laager at Salisbury during the Mashonaland rebellion of 1896, was said to be very friendly to white men though not to black. The present species was first exhibited in the London Zoological Gardens in 1861 when a male, purchased on September 17th of that year, was received in the collection: on July 17th, 1873, a second example—also a male—was purchased for the Gardens. The latter of these animals probably contributed to the entertainment of many a children's party; for having been photographed it appeared in a series of popular magic lantern slides illustrating life at the Zoo. It also served a more serious purpose, being afterwards employed with other animal photographs to direct attention to the serious waste of animal life in Africa.¹ A pair of sable, purchased for the Zoological Gardens on February 26th, 1895 (together with a pair of blue wildebeest and a giraffe) re-

¹ Renshaw: "The Vanishing African Fauna." Lecture before the Selborne Society, 1899. The sable was shown with the head down as if feeding; it carried a well-grown pair of horns, and its glossy black coat well indicated the splendid condition in which it was kept.

mained savage and dangerous after all their travels and repeated change of owner. The present writer studied these unruly creatures : both would strike savagely at the railings in frustrated attempt to injure the bystanders. In 1900 the writer, wishing to photograph a sable in a Continental collection, was surprised at the casual manner in which the keeper threw open the door of the paddock as if the dangerous tenant had been a sheep ! The man even used to enter the paddock, though there could be no question of the individual fierceness of this specimen, as she also would strike (happily from the wrong side of the bars) at visitors ! Sable have repeatedly been imported into Europe : living examples were kept at Cologne, Leipzig and Hamburg during recent years. Those in the late Cecil Rhodes' park at Groote Schuur near Cape-town—an ideal situation in their native Africa—became tame enough to lick the hands of visitors.

The following notes on the sable now in the Regent's Park collection were made by the writer in May, 1905. Beast in long summer coat; chestnut saturated with black, as if the black had been streaked in fine lines on a chestnut ground, thus giving a curious moist appearance to the pelt. (These fine lines by the way are excellently rendered in a figure of the extinct blaauwbok in Knight's "Museum of Animated Nature.") The black showed a purplish tinge, perhaps analogous to the bluish cast

said to have been exhibited by the blaauwbok. Black saturation most marked on the sides below the middle, Mane abundant, and since part lay on one side, part on the other, resembled a lady's fur boa laid along the neck. The animal being fully adult (over ten years old) a few of the mane hairs had become tipped with white. Very free mobility of muzzle and nostrils. When at rest the tail was carried incurved between the hind legs : when rubbing horns against the railings it was, however, allowed to hang free, while if the animal dashed playfully round its yard the tail was whisked about. This animal when chewing would stop abruptly and hold its mouth open for a few seconds, as if it had bitten its tongue.

It is interesting to remember that the type sable—the actual animal shot by Cornwallis Harris—is still in the National Collection^{*} where the present writer has carefully inspected it. Save for a brownish tint due to fading (or perhaps to immaturity, since the horns tape only 37 inches with a curvature obviously incomplete) this historic specimen remains much as it left Verreaux' workroom at Capetown, though the gallant hunter who shot it has long been dead.¹ To gaze upon it was to vividly recall the past : the long years seemed to have vanished, and one almost heard the crack of Harris' rifle echoing among the mountains of Cashan. There were the

¹ To the great loss of Zoology, Harris died in 1848 at the early age of forty-one.

two fatal shot-holes, situated in the shoulder exactly as he describes—"Again he tilted at me, and receiving both shots through the shoulder, was overthrown and slain." One could well realise the sensations of Harris as he bent for the first time over a trophy which no white man had ever shot before : and enter into the feelings of Robert Scoon, the only other who even claimed to have seen the black antelope alive. Scoon, when elephant-hunting like Harris, had met (so he said) a troop of sable : less dogged than Harris, he allowed his Hottentots to persuade him to leave the "unco' Black Boke" alone. The tse-tse fly crippling his oxen prevented the chase being resumed at a more fitting season ; so "bad luck to thae stupit Hottentots I was forced to come awa' without him."

THE MALAY TAPIR.

"I at length found myself as if placed in a charnel-house, surrounded by mutilated fragments of many hundred skeletons of more than twenty kinds of animals, piled confusedly around me. The task assigned me was to restore them all to their original position. At the voice of comparative anatomy every bone and fragment of a bone resumed its place."

Cuvier.

Few incidents in the annals of natural history have been more interesting and far-reaching in their results than the sagacious discovery by which the genius of Cuvier—the Columbus of the antediluvian world—opened the door of a vast treasure house, of whose very existence men had scarcely even dreamed. His attention having been attracted by the great number of bones which were being continually unearthed in the gypsum quarries of Montmartre, he examined load after load of relics, and succeeded in demonstrating that they were the remains, not of recent animals, but of extinct species abundant ages before the Deluge. The science of palaeontology (the study of extinct forms of life) became established, and the patient labours of *savants* working in all parts of the globe were rewarded with the successive discovery of new marvels.

In the Isle of Wight alligators had basked in Eocene sunshine. Huge zeuglodon whales seventy

feet long had ploughed the waves of Eocene seas. Hippopotami had bellowed in the rivers of Britain. The hills of Wales had resounded to the ferocious baying of wild hounds allied to if not identical with the hyæna dog of the Cape. Dryopithecus and mastodon, glyptodon and megalonyx had stood for the apes and elephants, the armadillos and sloths of recent times. In short, the bones of all kinds of strange beasts, recovered from pampas and savannah, from tundra and peat bog, were the wonders and trophies of the new learning.¹ Reverting to Cuvier's discovery, the quarries of Montmartre, the Paris basin, was a veritable graveyard of mammalian remains—a mine of information, a natural picture gallery or rather museum. Amongst the first animals restored by Cuvier was the *Palæotherium magnum*, a heavily built beast about the size of a horse. Its skull was remarkable for its short nasal bones and for its archaic number of forty-four teeth; the skeleton had an elongated neck, and there were three toes on each foot. It may be interesting in this place to conjure up a mental picture of the palæothere as it lived ages ago in Eocene times, when man was not.

Scene: a well-watered valley on the present site of Paris. A shallow river, half flood, half marsh, flows slowly between shelving banks, widening here

¹ At the sale of the Leverian Museum in 1806, Lot 53, a "fossil shoulder-blade bone of some large unknown animal, Shotover Hill" fetched 16s., and "a most noble specimen of the fossil scull and horns of the moose deer from Ireland, the horns measure thirteen feet from tip to tip," realised £61 19s.

and there into almost stagnant pools. The lazy surface of the pools is thickly studded with various water-lilies—*Nymphaea* and *Nenuphar*—their leaves bice green, their flowers pure white or exquisite yellow. Green masses of potamageton and chara form splodges of tangled vegetation which threaten to silt up the quieter backwaters. Here gentle ripples indicate the passage of a turtle, oaring his way through the tepid water; there a widening circle indicates the rise of a fish. A hideous crocodile floats in typical saurian attitude, ugly head just above water, body trailing supinely in the tepid stream: his sluggish temperament quickens into malevolent activity with the lengthening rays of sunset. High on the bank a tantalus stork, roused after its afternoon siesta, preens its feathers and striding into the mud probes with nibbling mandibles for worms and molluscs. Hard by, a cordon of pelicans line up in semi-circle, driving landwards the gasping fish.

And now appear, clumsily penetrating the thicket, a small party of palæothere, their dun coats smartly spotted and streaked with yellow. Heavy-footed and dull-witted, they splash along the oozy foreshore, and having slaked their thirst proceed to graze and browse, uttering now and then a bird-like whistle. High above them on the bank rise graceful palm trees,¹ towering lofty in the baking air. Far distant

¹ *Flabellaria parisiensis*.

on the plains lie acres of yellowing grass which no man will ever reap, while patches of clover¹ blaze in the afternoon sun. To these delights the palæotheres repair in open order, being joined as evening sets in by herds of graceful xhiphodon, long-necked and deer-eyed. The piping of snipe sounds thinly from the reed beds : and noiselessly threading the mixed groves of oak and elm, eucalyptus and mimosa, come troops of bats, squeaking in shrill treble as they flit moth-like over the darkening water. With the last rays of sunset are heard the howls of the hyænodons, antedating by thousands of years the doleful "laughter" emitted by their descendants of to-day.²

Such then is a picture of a world vanished for ever. Eocene, Miocene, Pliocene—each period is imbued with an intense romantic charm for the naturalist who can thus reconstruct for himself a series of mind pictures. One may well ask whether amid the highly evolved, greatly specialised beasts of to-day there yet remain any forms which have retained their original organisation unaltered through the ages—living fossils, so to speak—documents of Creation. Yes: the palæotheres of Eocene times are wonderfully perpetuated to-day in replicas true almost to every detail of the skeleton, as one may

¹ *Trifolium palaeogaeum*.

² There is reason to believe that the hyænodons (about a dozen species in Europe and America) were actually aquatic. They are, at any rate, known to have preyed upon water-tortoises.

take a *cliché* of a coin by firmly pressing on it with tinfoil. These "recent antediluvians" are found in Asia and America and are known as tapirs.

Modern tapirs are all stoutly built animals of medium size. The nose is prolonged into a short trunk; the eyes are small, pig-like, and deeply set in the head; the ears are rounded and rather short. The feet are broad, the anterior pair having four toes apiece, the hinder three; the tail is an inconspicuous rudiment. There are forty-two teeth, or only two less than in the palæothere; beasts indistinguishable from tapirs occur in the Upper and Middle Tertiary rocks of Europe and America, and in the Pleistocene caverns of Brazil. Of living species four inhabit South America; the fifth is the subject of this essay—the Malay or East Indian tapir.

The Malay tapir (*Tapirus indicus*)—maiba, tenok, and tennu of the Malays¹—stands from three to three and a half feet at the shoulder, and measures about eight feet from nose to tail. The largest of all tapirs, it agrees with the American forms in general outlines, but is remarkable for the greater length of the trunk and for the absence of the comb of sinewy fat which surmounts the nape of the neck. The Malay tapir is, perhaps, the most strangely coloured

¹ Sir Stamford Raffles distinctly states that the tennu is the Malay tapir: Dr. J. E. Gray, however, suggested that it was an unknown species of rhinoceros, since the beast was originally described as encircled with a narrow whitish belt and bearing a single horn (=proboscis).

of all mammals; for when adult, the head and anterior portion of the body and limbs are velvety black, and the sides and hind quarters greyish white. The two colours are so sharply contrasted that the animal appears to have had a cloth thrown over it: hence the name of "saddle-backed tapir" applied to it by wild beast merchants. The hinder aspect of the limbs is covered with very fine hair of a velvety texture.¹ In young animals, at any rate, the eye has a double-coloured iris—bluish externally and brown internally. Tapirs under four months old are brownish or black all over, spotted and streaked with brownish yellow above and white below: after attaining the age of four months they begin to assume the adult coloration. Youngsters in this transition state present a curious appearance; the two types of pattern struggle together, as it were, and remind one of a dissolving view in a magic lantern! At six months old the young tapir has donned his suit of irreproachable black and white: with advancing age the black deepens, while a delicate pearly bloom softens the grey of the back. A young tapir from Tavoy, Burmah, which Col. F. M. Jenkins presented to the London Zoological

¹ It is interesting to compare the coloration of the Malay tapir with that of the great panda, a black and white beast related to the bear family, discovered in Thibet by Père David. The panda, however, is mostly white: the eyes are encircled with black, the ears and limbs are also black, while a sable stripe passes transversely over the shoulder. It is said to be mainly herbivorous; but it has been thought that its startling coloration may conceal it from living prey among the black tree trunks on the snow.

Gardens in 1892, had the general colour of the adult, though spots were still visible on the legs.

The Malay tapir was first met with by Whalfeldt (not to be confused with Whalberg, a much later traveller in *Africa*) in 1772. He observed it to the south of the Cawoor river in Sumatra when engaged in surveying the coast. Although he mistook it for a hippopotamus, the sketch which he transmitted to the Government of Fort Marlborough showed it to have been a tapir. Nothing more was heard of the mysterious animal till 1805, when a small individual was brought from Queda to Penang for Sir George Leith, then Governor. Unfortunately the animal died during Sir George's absence, and the stupid servants threw the body into the sea. Some years later Major Farquhar, the discoverer of the binturong or bear-cat, began to collect information concerning the Malay tapir, and obtained a very young one which used to go tame about the house. In 1816 Farquhar communicated a description of the new species, together with a drawing, to the Asiatic Society of Bengal. Two years later the Museum of the Asiatic Society at Calcutta contained a tapir's head from Malacca. The French naturalist Diard figured a young specimen which had been sent alive from Bencoolen to the menagerie at Barrackpoor; this drawing being published by Cuvier in 1819. Sir Stamford Raffles sent home

two Malay tapirs (museum specimens) in 1820.¹ On leaving Borneo M. M. Diard and Duvaucel were permitted by Sir Stamford to bring home, amongst other natural history curios, a skin and skeleton of the Malay tapir: these historic specimens were lodged in the Museum of the Jardin des Plantes and are probably there yet, just as another of Diard's tapirs is still preserved at Leyden. Raffles himself attempted to bring home a live specimen; it unfortunately perished in the loss of the "Fame," with the clouded tiger already mentioned. On Sir Stamford's arrival in England in 1824 he brought with him the skin of a Malay tapir, and a complete skeleton with viscera preserved in spirit. Raffles presented the skeleton to the Museum of the Royal College of Surgeons, where it stands to this day: the viscera were dissected by Sir Everard Home, V.P.R.S., the brother-in-law of John Hunter, and himself an anatomist of distinction. On November 18, 1824, Home deliveed his Croonian Lecture on the seal and Malay tapir; "a paper on tapir" as *Punch* would have expressed it.

The Malay tapir inhabits Borneo and Sumatra though not Java; it also occurs on the mainland in the Malay Peninsula and in Burmah, being said to be quite common in Tavoy. It is a dweller in the

¹ See the account of the zoological collection made for the East India Company in Sumatra; the animals collected by Raffles. Notice of collection communicated to the Linnean Society by Sir E. Home, December 5, 1820.

hill jungles ; Müller found it in Sumatra at a height of 4,000 feet above the sea, thus resembling Roulin's tapir of South America, which lives some 7,000 feet up in the Corderillas. The Malay tapir browses on bushes like the black African rhinoceros, though it will also eat grass. It prefers the neighbourhood of water, where it can bathe and wallow in the mud ; frequenting the remoter mountain streams, it climbs with remarkable ease over fallen logs and other obstacles.¹ If alarmed, the animal dashes furiously into the densest thickets ; *Magno cedunt virgulta fragore*, the jungle gives way before it. When lying down, this tapir is said to exactly resemble a grey boulder, its magpie coat, divided into two sharply defined areas, actually rendering it *less* conspicuous than if it had been uniformly coloured. The smartly spotted dress of the young ones is equally protective, since the spots and streaks resemble the splashes of sunlight filtered through the tangled brake.

The Malays are great trappers of animals, and take rhinoceros and tapirs alive in carefully contrived pitfalls. The rhinoceros trap—doubtless similar ones are employed for tapirs—consists of a small pit about six feet across and proportionately deep. The sides slope gently to the bottom so as not to injure the quarry in its impromptu descent; the captives are wanted alive for menagerie purposes,

¹ The writer has seen a captive specimen voluntarily rear up on its hind legs and paw at the railing of his pen, as if seeking a foothold.

being often imported into Europe. A light platform laid over the pit is covered with mud, and the whole made as natural as possible so that the rhinoceros—or tapir—approaching the spot may be tempted to have a roll in the delicious (?) mud—thus snapping the platform, and sliding *sans* ceremony to the bottom of the pit. The earth in front of the animal's head is then carefully dug away and a cage of rattan-ropes let down; the frail intervening partition being broken through, the animal rushes into the cage and is secured. Newly caught tapirs are inclined to bite, but soon become tractable: one which the present writer saw in the Antwerp Zoological Gardens in 1899 was quite tame, allowing himself to be pulled about in any direction. Probably this little fellow was some five months old, his spotted coat being in the transitional state of semi-obliteration already mentioned; in the same collection was a magnificent adult specimen in excellent health, as its coat of jet black and pearl grey amply testified.¹

A Malay tapir, perhaps about two years old, was received in Liverpool in the autumn of 1904 and sold to a well-known zoological garden. This animal was a very interesting subject to study. In the early morning, true to the habits of the jungle he had left for ever, he was active, uttering a peculiar whistle as he paced his cage, his shapeless head swaying up

¹ Renshaw: Notes on the Zoological Collections of Amsterdam, Rotterdam and Antwerp: *Zoologist*, 1899. A Malay tapir was living in the Melbourne Zoo in 1900: and two in the Gardens at Breslau in 1902.



MALAY TAPIR.

The individual described on page 153. Note the curious antediluvian appearance of the animal. The stout, smooth, heavy body, is well adapted for forcing a passage through the tangled jungle. The pied colouration almost suggests that a white saddlecloth had been thrown over the back; hence the trade name of "saddle back tapir."

and down at every stride : in walking the minute tail was carried curved under the body like the telson of a prawn. Towards midday this tapir would lie down in his sleeping box, nibbling and playing with his bed, nosing about in the hay, or chewing it like a horse. He often rested on his stomach, fore-legs lightly crossed at the wrist, and outstretched neck pressed in antelope fashion close to the ground. He was always ready to come out of his box at the call of his keeper, delighting to be stroked ; and if groomed with a hard brush would stand still as long as the pleasing titillation lasted. When pacing his compartment he continually inspected various objects, snuffling and blowing like an anteater ; to which beast, with his elongated black head, he really bore some resemblance. This tapir frequently lowered the head till the tip of the trunk was only a few inches from the ground ; when he desired to touch anything the trunk by a peculiar dipping movement "jumped the rest," like an engine on a badly-laid railway. The under surface of the trunk was lined with a triangular continuation of the mucous membrane of the palate and gums, the apex of the triangle being anterior. The extreme tip had a minute pit (the exact reverse of the "finger" in the Indian elephant) caused on each side by the projection of the almost tubular nostrils. In captivity tapirs will eat fruit and boiled rice : the present example would readily take carrots. Unfortunately these curious beasts do

very badly in zoological gardens, even when they are provided with a daily bath. They seem to be particularly subject to intestinal diseases : a Brazilian tapir in the Philadelphia Gardens died of chronic enteritis, followed by the telescoping of nine inches of the ileum in the caecum. Probably in most of these cases the feeding is wrong : one seldom if ever sees captive tapirs allowed the twigs of trees and bushes natural to them, and the hay given may set up fermentation in the stomach, with resultant gastric catarrh. Many do not last even twelve months, and the writer is acquainted with one instance where the animal—perhaps injured in capture—barely survived for four weeks his arrival in London. Therefore it was hardly a surprise to find on revisiting the collection, where the two-year old tapir had been inspected and photographed but a few weeks before, that the cage was tenanted by another animal : the tapir had been gathered to his fathers.

THE NORTHERN SEA-COW.

“The days grew long and longer
Till they became as one,
And southward through the haze
I saw the sullen blaze
Of the red midnight sun.”

The North-west Passage! What a record of perilous adventure and courageous effort is chronicled in the history of the various attempts to find a sea channel between the Arctic and Pacific Oceans! Ever since, in 1596, the States General of the Dutch Republic offered their prize of 25,000 guilders for the discovery of such a passage, the accomplishment of this feat has attracted sailors of many nations, the various European peoples vying with each other in gallant rivalry. Barents (1596), Hudson (1610), Behring (1741), Chelyuskin (1742), Franklin (1848) are but a few amongst the host of heroes whose names are more or less closely associated with this quest. Incidentally, much valuable information on geography and zoology has been gathered by the voyagers. Indeed, to Herr Steller, a German naturalist who accompanied Behring’s last expedition, we owe practically all our knowledge of that uncouth beast, now extinct—the northern sea-cow.

The sea-cow or rhytina¹ (*Rhytina stelleri*)—morskaia korova of the Russians—was a large animal attaining a length of about 30 (or even 35) feet, a maximum girth of about 20 feet, and a weight of some 8,000 lbs. (3½ tons). Closely allied to existing sirenians (manatees and dugongs) it resembled them in its small head broadening from above downwards, in its smooth body provided with anterior flippers only, and in its forked tail. It differed from them in its toothless mouth, the dental apparatus being replaced by horny pads on the palate and lower jaw. The lips were freely movable, the upper one being fringed with white bristles, translucent like those of a walrus. The tongue was pointed and rough. The eyes were small like a sheep's, with a black iris. The neck was rounded and but slightly marked, passing imperceptibly into the huge conical body, which ended in a fluked tail. The flippers were roughened with bristles and may have exercised some adhesive action similar to that stated by Sir Everard Home to be exerted by the walrus. The skin was extremely thick and tough, wrinkled, and of a dark brown colour, varied with lighter spots or streaks.² These strange wildfowl from their superficial resemblance to cetaceans were, together with manatees and dugongs, formerly placed

¹ Rhytina (less correctly rytina) is from the Greek *ρυτίς* = Latin *rugā*, a wrinkle.

² Very young examples of the Australian manatee are similarly of a dark chocolate hue.

by naturalists with whales and porpoises, but are now justly ranked as a separate class of mammals—the Sirenia. The sea-cow was remarkable in inhabiting the icy waters of the Northern Pacific; existing sirenians are found only in hot climates, frequenting the coast in shallow water, and in the case of the manatees, also ascending the rivers.

The discovery of the rhytina constitutes one of the romances of natural history. In November, 1741, Vitus Behring, the well-known Danish navigator, who held the rank of captain in the Russian Navy, was drifting hopelessly at random in the sea which bears his name. He managed to cast anchor off what is now Behring Island: the storm in an hour tore through the cable and dashed the unmanageable craft towards the shore. By a happy chance she drifted into a deep basin which formed a natural harbour, and by the exertions of Lieutenant Waxell and Herr Steller (a German physician and zoologist) the scurvy-sick crew were safely landed. Many of the invalids died: doubtless it was due to the energy and resourcefulness of Steller that more lives were not lost. Owing to the imperative need of nursing the sick the vessel had to be abandoned—grounding in a violent storm she broke up and many of the provisions were lost. The crew were thus compelled to take to hunting: they ate sea-otter meat and also the flesh of two whales that had been stranded. In the spring there arrived more food in

the shape of sea-lions and sea-bears: during the latter part of their stay Behring's men had further provender in the swarming sea-cows, which pastured in the sheltered bays and estuaries of the island. The dull-witted, dun-coloured rhytina fed along the shore in immense numbers—the marine herds of Father Neptune.

The sea round Behring Island is supposed to be to this day one of the richest localities for sea-weeds in the world, producing veritable marine forests 20 or 30 metres high. Ruprecht, in his work on North Pacific sea-weeds, records no less than eight species of laminaria alone. In Behring's day the rhytina browsed thickly upon this abundant sea-tangle, like land cows in a meadow. It has been supposed that the roughened surface of the flippers enabled the beasts to retain a better hold of the sea-weed: and since they were said to be unable to dive they were obviously fitted for life in shallow water rather than in the open ocean. Probably like the existing dugong of the Tropics, these herds of sea-cow resembled collections of floating logs: for they were clothed in a bark-like epidermis an inch thick outside the true skin. This epidermis was even smooth on section, like wood. The thick hide, by retaining the body heat, doubtless prevented the rhytina from perishing of cold in the icy waters of Behring Sea. Under the hide again was a stout coat of blubber, white in life, yellow on exposure to the sun. When

they came up every few minutes to breathe the rhytina raised the greater part of their bodies above the water, as has also been recorded of the dugong. One sees in this frequent respiration (which reminds one of the repeated blowings of the river-haunting hippopotamus) another indication of the unfitness of the rhytina for the open ocean.

The sea-cows, when feeding, used to collect all the younger animals in the centre of the herd, surrounding them with a friendly cordon; family groups could also be observed, all feeding together as they harvested the fucus with prehensile lips. They showed a remarkable preference for the soft, leafy portions of the weed and rejected the harder roots; they preferred, especially, four species of weed, which modern observers have supposed to be various forms of *Thalassiophyllum*, *Dumontia*, &c. Owing to their great heavy bodies and small flippers they were unable to leave the water, being compelled to retreat with the tide for fear of being stranded—a fate which actually overtook some luckless individuals found by Behring's men. Rhytina were also liable to be suffocated in winter by floating ice, their bodies being cast up on the shore.

Occupied in the more profitable chase of the sea otter,¹ the shipwrecked crew did not begin to attack the rhytina till within a few weeks of their departure.

¹ Behring's party took between 800 and 900 head of otter during their stay of ten months.

The sea-cows were killed with harpoons, the comrades of the wounded animal showing much sympathy and even attempting to rescue it. Males would follow wounded females to the shore, lingering for days in the neighbourhood of the carcase. Owing to the weight of the body, the efforts of forty men were required to land the quarry. Even when secured, the tough skin required an axe to cut it; the meat, however, was found eatable, and doubtless welcome enough to a sailor's palate. The flesh of one rhytina would feed thirty-three men for a month. When in August 1742, the survivors of the shipwrecked vessel sailed for Kamchatka in a "home made" craft, which the tough old souls had pieced together out of various odds and ends, they took with them several barrels of rhytina flesh, carefully salted for provision. Unfortunately, their leader was no more; worn out with sickness, Behring had died in December 1741. Steller remained some time in Kamchatka to study natural history; but having also imprudently criticised the authorities, was put on his trial at Irkutsk, and eventually died in Siberia.¹

In view of the toughness characterising the hide of the sea-cow it is regrettable that no effort was successful in preserving at least a skin of so durable a trophy for scientific examination. The industrious Steller had prepared the hide and skeleton of a

¹ The loss of this gifted scientist is said to have been due to the hard-hearted negligence of his guards; while they went to drink in a public-house he froze to death outside.

rhytina calf ready for transport, but owing to the cramped quarters alone available in the make-shift boat they had to be left behind. A drawing of the animal was, however, made by Lieutenant Waxell, and a sketch given by Steller to Pallas was published in the latter's "Icones ad Zoographiam Rosso-Asiaticam" (Fasc. II.). Some incomplete skeletons were preserved by Behring's party, while a valuable account of the animal by Steller was published in the Memoirs of the Academy of Sciences of St. Petersburg.¹ At this date (1741) the rhytina still abounded on the Commander Group (Behring Island and Copper Island), perhaps also occasionally reaching the coast of Kamchatka: it is interesting to trace its gradual decline and fall, brought about quite *indirectly* by the agency of man.

The disappearance of the sea-cow well illustrates how an attack directed against one species of animal may remotely, yet disastrously, affect another. The swarming fur animals (blue foxes and sea-otters) of the Commander Islands promised a rich reward for any hunters hardy enough to face the discomforts of this icy El Dorado. The pelts obtained by Behring's party were sufficient guarantee of the monetary value of an expedition, and accordingly we find that hundreds of foxes were slaughtered by subsequent

¹ Steller's account of the rhytina is a masterpiece of science for accuracy and value, especially when we remember that he was at the time a shipwrecked castaway, without library or appliances.

hunters. Chodilov during 1747-48 took 1,481 blue foxes and 350 sea-otters on Behring Island : Jugov in 1751-53 killed 6,844 black foxes, 200 white foxes, 2,212 sea-bears, and 790 sea-otters : a third worthy obtained over 2000 blue foxes and over 1000 sea-otters. The Siberian fur-hunters in the race for wealth made their head-quarters on the Commander Islands, and several expeditions were fitted out to winter there. All these adventurers required food : the flesh of the sea-cow, if not appetising, was at least eatable, and being fresh meat would ward off scurvy—the bane of all the early Arctic voyagers. The consequence was that the otter hunters used to call at the Commander Islands for sea-cow flesh as modern steamers stop at Aden for coal. The *rhytina* was hunted by men in boats—eight men to a boat—one of whom standing in the prow harpooned the stupid quarry with a *pokoluga*, or long iron lance, the others plying the oars. The sea-cow having been struck, the hunters retreated lest the struggles of the victim should sink the boat. Apparently this species was very "soft" : it soon ceased to struggle, turning belly upwards like a dying goldfish. The carcase was then towed to shore with stout thongs, and cut up as quickly as possible, owing to its special liability to putrefaction. The skin made good light skiffs, like the kayaks which the Esquimaux make from walrus or seal-hide. Since it was easy to slaughter one after

another out of a herd, many wounded sea-cows were lost: they died of their wounds but were not cast upon the beach till too putrid for consumption, and were thus wasted. One could even without a boat swim up to and harpoon these witless creatures! Apparently but a single calf was produced at a birth: here one sees another factor tending to early extermination. Now the rhytina being badly equipped at best for ocean life was compelled *nolens volens* to approach the shore to feed on the seaweed: it was ill adapted to struggle with the storms of winter, and even under normal conditions appears to have been lean indeed in the spring. Whether, therefore, the sea-cows were exterminated by hunters who killed them for salting, or whether they were merely frightened away from the marine meadows so that they eventually starved to death (being unable to dive in the ocean abyss for food) the result was the same: they eventually became extinct.

A praiseworthy effort was made in 1755 by Pet. Jakovlev, a man far in advance of his times, to save the northern sea-cow. When prospecting for copper on the Commander Group—being a mining engineer—he found that the rhytina had already disappeared from Copper Island. He, therefore, on November 27th, 1755, petitioned the authorities of Kamchatka to protect the species: this being perhaps the first suggestion for national game preservation, afterwards so nobly developed in the United States,

and to a lesser degree in South and East Africa. Perhaps Jakovlev was not altogether disinterested in his efforts to save the sea-cow : for we read that he had himself found it impossible to winter in the Commander Islands owing to lack of this food. On Behring Island the rhytina lasted for some time longer : it is recorded that in 1762 Korovin called there for sea-cow hides and flesh, while Baron Nordenskiöld has shown that in 1779-80 these animals were still being killed as they fed on the sea-weed and their skins used for *baydars* (=skiffs). Pallas' writings (N. Nord. Beitr. I.S., 295) seem to indicate that the rhytina formerly inhabited three small islands—Attak, Schemija, and Semitschi—between lat. 54° and 55° . Elias Vosnessenski actually obtained sea-cow bones from Attu (=Attak) Island; but although he spent nearly eight years in the North Pacific and was a thoroughly competent naturalist, he neither saw nor heard of any *living* rhytina. It has been stated by Sauer that in 1768 the last sea-cow was killed on Behring Island;¹ but Nordenskiöld has demonstrated that the rhytina lasted to a much later date than that generally assigned to it. Two Creoles (Russo-Aleutians) informed him that about 1854 they saw at Tolstoj-mys on the eastern shore of Behring Island a very lean beast, "thick before and small behind, with *small*

¹ Saner's statement seems to have been widely accepted, unfortunately, by naturalists who ought to know better.

fore feet: it blew through the mouth, was brown with lighter spots, and had no back fin. This can scarcely have been anything else than a rhytina in poor condition, probably from short commons—a veritable Nestor of its race, connecting the nineteenth century with the dim days of Behring and Steller—the last of the sea-cows!

Further study of the vanished rhytina resolves itself into an academical survey of its remains. These have been discovered in considerable quantity by probing with iron rods or bayonets in the grass-covered gravel of the Commander Islands, just as at the seaside one bores the sand for cockles. The bones are found at a depth of from thirty to fifty cm. below the surface; many nearly perfect skeletons have been obtained. In 1831, the only specimen of the sea-cow in any European museum was a horny lamina from the palate, which lay dusty and unnoticed in the museum of the St. Petersburg Academy till recognised and described by Brandt. Vosnesski, who visited Behring Island in 1844 by order of the St. Petersburg Academy of Sciences, obtained some rib bones and fragmentary skulls lacking the lower jaw: on September 6, 1861, a report was presented to the Academy on a complete skull and some bones also obtained by him, together with a nearly perfect skeleton which had been sent by the Russian-American Merchants' Company. In 1863 Nordmann described and figured the rhytina

skeleton now preserved in the University Museum, Helsingfors. It was said to be that of a young sea-cow, being one-third less and also more imperfect than the specimen preserved at St. Petersburg, many of the bones being missing. Baron Nordenskiöld's party filled twenty-one large casks, boxes, or barrels with bones. Three very fine perfect skulls were brought home by them, and a fine *rhytina* skeleton, doubtless constructed from this grand series, was subsequently exhibited at the "Vega" exhibition in the Royal Palace at Stockholm. Alexander Brandt attempted by means of a plaster cast of the cranial cavity to gauge the size and weight of the sea-cow's brain, which was found to be intermediate between those of the manatee and dugong. A nearly complete skeleton 19 feet 6 inches long from Behring Island was acquired early in 1885 for the National Collection, and may now be seen cleaned and mounted in the Natural History Museum at South Kensington. It was purchased from Mr. Robert Damon, F.G.S., who had himself dug it up from the Pliocene deposits of compact peat: indeed, peat was actually found inside the skull and hollow bones of this specimen (see Proceedings of the Geological Society of London for March 25th, 1885). In the Royal College of Surgeons' Museum will be found a cast of a magnificent *rhytina* skull in the Zoological Museum of the Imperial University of Moscow. M. Anatole Bogdanow, Director of the Moscow

collection, presented this cast to his English colleagues in 1876.

The small skull of the *rhytina* is remarkable for the strong development of the nasal bones, which in living sirenians are mere rudiments; the premaxillæ have a downward curve as in recent forms. So loosely were the sutures united in the London specimen that it was found possible to take a gelatine cast of the brain cavity, as Dr. Brandt had done in a previous instance. The neck, though short, still retains the normal mammalian number—seven—of cervical vertebræ; the sternum, or breast bone, is composed of three pieces, and there are nineteen pairs of ribs. The bones of the skeleton are strong and massive, the ribs being actually used by the natives for carving or as sledge-runners. The vertebræ immediately above the root of the tail are not fused into a single mass or sacrum, since such an arrangement would have inconvenienced an animal which, like its living congeners, also moved by freely flexing the tail. Steller (*fide* Brandt) distinctly said “Motus organon essentiale autem pinna caudalis praebuit” and again “Caudae motu versus dorsum et ventrem autem corpus impetuosissime propellebant.” The manatee acquired by the Zoological Society in August, 1875—the first living specimen in England—similarly moved the tail up and down, not laterally as in seals: hence the value of a perfectly mobile sacrum will be apparent. From

comparison with recent forms, one may assume that the stomach of the sea-cow was divided into several chambers, that the lungs were simple, and that the diaphragm, or midriff, was set obliquely in the body to allow them to increase in length.¹ Further than this, speculation will hardly take us, and with these words we close our account of the northern sea-cow.

The greater includes the less: with the rhytina there perished two species of invertebrate parasitic, one upon it, the other inside. The *Cyamum* (or *Sirenocramum*) *rhytinæ* was a small crustacean which stuck like a whale-louse to its thick skin, swarming in the softer parts of the hide. The cyamum "dimidiam plerumque unciam longa" had a head the size of a millet seed; it stuck firmly to its host by means of its sharply pointed claws, and obtained nourishment by plunging its beak into the rhytina. Transparent though it was, this parasite did not escape the sharp scrutiny of the seagulls which, perched on the back of the sea-cow, picked up the swarming vermin like rhinoceros birds relieving a buffalo. Then, again, the paunch of the rhytina was infested with white ascarid worms in the single viscus examined by Steller. Unfortunately owing to the unwieldly nature of the carcase

¹ Judging from the allied manatee, the lungs of the rhytina were like a banana leaf in shape; perhaps when full of air they acted in some degree like a swimming bladder. Certainly the pulmonary organs are well adapted to allow the freest aeration of the blood, as shown in the beautiful arterio-venous traeery exhibited by the injected manatee lungs now in the Royal College of Surgeons' Museum.

and the lack of sufficient helpers, Steller was unable to accurately study more than one stomach. These parasitic worms hence remain for ever undescribed : Rüppell and Owen however found ascarides in the allied dugong.

The discovery of the *rhytina* was one of the many side issues of the persistent search for the North-West Passage. When one reflects on that long long history of brave effort and persistent endeavour, of heroic fortitude and calm resolve, one realises indeed the feelings of the crew when on July 20th, 1879, the blue-yellow ensign of Sweden ran up the masthead of the "Vega" and the Swedish salute pealed over the icy sea. The sufferings of Barentz and Behring, of Hudson and Franklin, were all forgotten : the North-West Passage had been achieved !

THE WHITE WHALE.

On the afternoon of August 14th, 1904, the writer was crossing the Bay of Biscay on the Deutsch Ost Afrika liner "Kanzler" from Hamburg for Dar es Salaam. The sea was absolutely devoid of ships; we seemed alone on the heaving surface of the ocean, save for the tiny birds—stormy petrels—that unceasingly glided like so many black swallows over the creamy wave of the steamer. Suddenly there appeared a number of black objects, swimming in files two or three abreast as they glided through the water. It was a school of porpoises, black above, white below—marine magpies. Swimming with easy undulations these fine beasts crossed the wake of the "Kanzler" and were soon lost in the distance. On the next day another school was seen. Now both petrels and porpoises are equally supposed by sailors to presage a storm: surely the appearance of both together was an evil omen! Unfortunately for this venerable superstition the sea remained smooth as glass: no ill fortune followed, save that by reason of a sea fog on the third day out from England the "Kanzler" had to anchor in Trafalgar Bay, the misty air resounding with the repeated whistling of the "ships that pass in the night."

Next day in perfect weather we skirted the sand-hills of Spain, and with the towering headland of Africa to starboard sailed safely through the Straits of Gibraltar.

The smart appearance of the porpoises seen in the Bay impresses vividly upon one's mind the fact that many cetaceans (whales, porpoises and dolphins), in spite of their uncouth and fish-like outlines, are very handsome animals. Thus the white-beaked dolphin (occasionally seen off our own shores) has a greyish-white snout and creamy-white sides, while a purplish *nuance* plays on the black back like the fugitive shimmer on a bird of paradise. The short-beaked dolphin is extremely smart, a kind of marine zebra, handsomely streaked with *longitudinal* black and white; the slender dolphin is dotted all over with white spots; the curious black fish is entirely of a sable hue. A striking contrast to this latter animal is seen in the beautiful beluga or white whale of the Arctic Seas.

The white whale (*Delphinapterus leucas*)—beluga of the Russians—hvítfisk or hvidfisk of the Scandinavian sailors and Danish colonists of Greenland—kelelluak of the Greenlanders—measures about sixteen and a half feet in length and is about nine feet ten inches in maximum girth. The head is short and rounded, with a convex forehead cushioned with fat. The eye is relatively small, and the orifice of the ear is almost concealed by a well-developed

tragus; the jaws curve downwards in the middle line. The dorsal fin is almost absent, though indicated by a slight ridge: the blunt flippers are short, broad, and of an oval contour; the tail, set horizontally as in all cetaceans, is flat and powerful. The smooth skin of the adult beluga is of a beautiful creamy or waxy whiteness throughout. Newly born animals are dark slate colour; calves of eight feet in length are dark slate mottled with chocolate; next they become yellowish, and finally white.¹ A young skull of King's white whale (the so-called *Delphinapterus kingii*) was said to have been brought from the coast of Australia many years ago; it was described by Dr. Gray in "Ann. Philos." 1827, p. 375, and figured in "Zool. Ereb. and Terror" p. 30, pl. VII. It is now in the National Collection.

First described by the Russian naturalist Pallas (beluga = white in the Russian language), this beautiful whale inhabits the circumpolar seas, being *par excellence* the whale of Greenland. It is also plentiful off the coasts of Novaya Zemlia and Spitsbergen, in Hudson's Bay, Bass Straits, Behring Sea, Okhotsk Sea and the St. Lawrence River in North America. A school of at least three hundred and fifteen individuals was recorded from Point Barrow, Alaska, in

¹ An embryo beluga in the Royal College of Surgeons' Museum is of a smooth shining creamy whiteness throughout, giving an impression of hardness as if it had been cast in plaster; the bones of the hand can be seen in the "biscuit china"-like flipper. Doubtless the slate colour of the newly born calf is due to later pigmentation in the *rete mucosum* of the skin.



WHALE ROOM IN THE NATURAL HISTORY MUSEUM.

Half-models of various cetaceans. Note the white whale and the narwhal in the foreground. A fragment of an abnormal narwhal skull, with two tusks, is also seen.

1898. In winter the ice prevents the beluga from coming up to breathe, hence they congregate in great numbers wherever there is an ice gap, hundreds often crowding together in an Arctic black hole of Calcutta, as happened near Christiansaab in Greenland in April 1860. The white whale has been observed to come up to breathe every ten to twelve minutes, only two or three seconds being consumed in inspiration and expiration; a torrent of water is *not* ejected from the blowhole as usually misrepresented in natural history books. The accurate and careful Scammon has figured a beluga in which the warm vapour, condensing in the icy air, is seen as a jet of steam above the spiracle. The front of the back appears first, then the blowhole, as the whale spouts; the broad white flukes are exposed in descending.

Sociable and carnivorous (or rather piscivorous) the beluga undertakes long migrations, probably in pursuit of prey. These animals subsist on cod and haddock in the open sea; but also pursue bottom fish, such as halibut and flounder, into shallows near the shore. For this work the white whale is well suited, being not only very fleet, but also provided in its well-armed jaws with an efficient fish-trap, the closely set teeth interlocking accurately so as to hold the slippery victims. Indeed the beluga is as much a beast of prey as a lion, though with a very different exterior. It eagerly follows salmon for

long distances up the rivers. White whale have been recorded on the Yukon River at a distance of seven hundred miles from the sea. In June, 1815, a male beluga which had frequented the Firth of Forth for three months was killed and dissected. A paper on it was read by Mr. P. Neill before the Wernerian Society on December 17th, 1816, while Dr. Barclay gave an account of its anatomy at the next meeting.¹ The stomachs of these animals, curiously enough, have been found to contain sand. A school of beluga on migration is said to be a very beautiful sight; the cetaceans ploughing through the dark billows in snowy files, while the little auks flap heavily along the heaving surface and the saddle-back seals bask on the ice floes. Blue drift ice, topped with creamy snow and shot with green under the water line; and a distant glimpse of the mossy valleys of Greenland, where the Arctic foxes bark huc huc, and the whirring ptarmigan rise from under the feet of the chance wayfarer, complete a picture of wild life unrivalled for its silent charm and Arctic beauty.

Although the white whale is often the hunter, it is also frequently the hunted, and that by the savage orca or grampus, aptly styled by naturalists *Orca gladiator* and by fishermen the "killer." These

¹ Length of this specimen 13 feet 4 inches; girth nearly 9 feet; an immature animal. The figure of a beluga lying on rocks in Rev. J. G. Wood's Natural History is apparently copied from Syme's figure of this individual.

sea-tigers are about twenty feet long, and smartly pied, like porpoises, in black and white; their temper is fierce, their appetites ravenous. They devour immense quantities of cod, skate, and halibut. They kill lesser porpoises, dolphins, and seals, and even harry the huge "right" whale of Greenland, leaping high out of the water, and striking it with their tails. Grey whales are savagely attacked and their calves murdered, torn to pieces, and devoured with ferocious haste. Even the formidable walrus is fiercely beset for the sake of its young. Perched on the back of wary mothers, heavily armed with long tusks, the little walruses might well be deemed safe, but the orca suddenly butting the old walrus, the luckless infant is pitched into the water and promptly crushed and swallowed. Many years ago Eschricht examined the stomach of a sixteen-foot killer. It contained the remains of fourteen porpoises and about as many seals in a hideously tangled mass; the skin of an additional seal had choked it. Captain Scammon's party once took another killer off Asuncion Island; its stomach was full of young seals. Well might Linnæus style this ferocious creature "*balænorum phocarumque tyrannus!*" In this category of destruction the defenceless beluga, conspicuous in its creamy hide, is not spared. It is said that white whales when pursued by the orca will even run ashore in their terror; Virgil's line, *Inter delphinias Arion*, might with dire significance

be transformed into *Inter belugas orca*. Captain Holboll relates how in 1827 a school of killers pursued some beluga into a bay near Godhaven in Greenland, and not only devoured many, but completed matters by massacring the survivors in sheer blood-thirstiness! Such frightful rapacity reminds one of the savage instincts of the Cape hunting-dog; the orca, however, seems yet more blindly ferocious than the wild hound, since Mr. R. Brown has recorded that on one occasion a white herring boat was attacked by some killers, who apparently mistook it for a white whale.

The beluga has another and yet more formidable enemy—man; for this whale is encased in a valuable coat of yellowish-white blubber four inches thick, and yielding about one hundred gallons of oil. Although the supply furnished by each animal is but limited, the great number of individuals which can be simultaneously taken amply makes up for this; besides, the oil is of excellent quality, while the skin is tanned into a strong supple leather sold under the name of “porpoise hide” for the manufacture of bootlaces. In Greenland the white whale is hunted by Eskimo and Danes; any large schools presenting themselves at the ice holes “receive prompt attention.” The natives of Alaska shoot them, tying the bodies to the ice, as it is said that if not thus secured they sink (like a hippopotamus under similar conditions) and are lost. Beluga entering the fiords of

Greenland or the rivers of North America are cut off from the sea by immense nets or even mere rows of stakes set across the channel; being then shot or harpooned, or merely driven on shore. Small ones can be taken like fish with a baited hook. A beluga fishery was established many years ago on the Tigel River in Eastern Siberia, thirty miles from the sea, the whales being lanced or harpooned from June to September; in Spitsbergen, immense nets are used which will take great numbers of these animals simultaneously.¹ Tromsoe is also a seat of the white whale industry. The commercial value of each beluga being about £3, one might envy the earlier whalers, since it is said that in 1868 a single ship captured hundreds, and that in those days, at any rate, a captain could reasonably expect to take yearly five hundred beluga and narwhal—chiefly the former. The Greenlanders are said to dry the flesh for food (reminding one of the porpoises brought to English tables in the days of Henry VIII.), while windows are (or were) made from the sheets of delicate membrane (? peritoneum) which line the whale's interior. Lastly, the carcases are sometimes utilised in the Norwegian guano factories.

The beluga is one of the few cetaceans which have been exhibited alive to the public. In 1865 an example was living in the Aquarial Gardens at

¹ Beluga nets are used by Norwegians, Russians and Samoyeds alike. It is said that in 1880 three hundred white whales were taken in Magdalena Bay at a single cast!

Boston, U.S.A.; eleven years later one was exhibited at the Westminster Aquarium, and was followed in a twelvemonth by another, which was shown at the same institution, and is figured in Flower and Lydekker's "Introduction to the Mammalia." In 1880, a fourth individual was safely brought to New York. Other examples were consigned inland to Cincinnati, though they unfortunately died before actually reaching their destination. A pair were taken on the Rivière du Loup, in Canada; they were immature animals, the male being nine feet long and the female about ten. Packed in strong boxes carpeted with seaweed, and accompanied by an attendant who constantly moistened the blowhole with a sponge, they were forwarded to the New York Aquarium, where they arrived on June 5, 1897.

The white whales proved an immense attraction; unfortunately, the female had been injured in transit and only survived five days. The male fed well on live eels, which he chased round the tank, always swimming in the same direction. One of these eels proved as fatal to the whale as the piece of bread to Earl Godwin; for the fish getting into the air passage of the unfortunate beluga suffocated him, this accident happening several weeks after arrival. Efforts were made during the summer of 1904 to obtain two more white whales for the New York Aquarium from a fishery on the St. Lawrence, but without success. The attempt, however, is to be repeated.

Although the white whale has thus been frequently kept alive as an aquarium exhibit, it is but imperfectly represented in museums. A very young individual is preserved at Leyden ; but it will be found that as a rule, cetaceans are rare in mounted collections of natural history. The immense size of many renders them highly inconvenient subjects for exhibition ; besides, as pointed out by the late Sir W. H. Flower, the oily skin is exceedingly difficult to preserve in a satisfactory manner. Even the small stuffed porpoises one sees, painted as near as may be in their natural colours, are at best shrivelled and unsatisfactory ; hence the exhibition of these marine denizens is usually limited to a presentation of their skeletons, with one or two very immature specimens bottled in jars of spirit. Of late years, however, a considerable advance has been made in this field of museum art: cetaceans and fishes, in fact many other subjects to which this difficulty applies, have been beautifully modelled in *papier mâché* or other composition, the counterfeits being tinted in the natural colours and giving a more life-life representation than could ever have been executed with the dubious aid of a mummy-like, dried-up skin. In addition, models made by this method are of wonderful lightness, yet very strong; it is recorded that a huge fish (skate) which cast in plaster required several men to lift it, when reproduced in paper could be easily held out in one

hand! Subjects thus treated may be placed on the floor of the casting-room and a box built up around them; a plaster mould being then made in two halves is set aside for some time to dry, and then carefully and repeatedly oiled and greased inside. The actual model is afterwards made by pasting many thicknesses of paper inside the mould; having gradually dried for several weeks it is then ready for strengthening by the addition of a wooden skeleton to its inside. Last of all come the finishing touches—the rounding off of superfluities with knife or file, the colouring with oil paints, and the mounting of the completed facsimile in the museum gallery. In many instances half models only are executed, the actual skeleton of the animal being displayed on the inner side against a black lining.

An extraordinary specimen is preserved in the museum of the Royal College of Surgeons (No. 2935^A in the Pathological Series), being the articulated skeleton of a beluga taken near Dunrobin Castle, and presented to the collection in 1879. On examining the neck vertebræ, the atlas, or first vertebra, is seen to have been dislocated during life from the occipital condyles, with subsequent bony union! This example is probably unique in the annals of pathology. Broken hearts are said to be capable of repair, but broken necks are usually considered to be beyond mending.

One may here mention that curious belief of the Greenlanders—that the beluga is the female of the

narwhal. This narwhal (in reality a near ally of the beluga) is a fine cetacean about fifteen long and sharply differentiated from the white whale by reason of the long tusks, spirally grooved, borne by the males. Sometimes, as in the fragment figured in this work, a narwhal is seen with *two* tusks. The colour of these sea-unicorns is an indistinct greyish mottling, paler below like that of a young white whale ; but old animals become quite beluga-like in their pure white hide. The narwhal also resembles the beluga in its incomplete dorsal fin; in its preying upon fish and cephalopods; and in its preference for the colder seas. Three examples only have been observed on our shores.

A white whale was recorded from the mouth of the Tyne on June 10, 1903 ; another was seen off Scarborough on August 19 of the same year; while in 1904 a third example was seen on August 11 careering up and down Loch Fyne. On November 5, 1904, a beluga passed the Marine Drive at Castle Hill, Scarborough, within sixty yards of the wall. It was going northwards, and its respiration could be plainly heard. Another, which had gone a long way up the Yorkshire Ouse, and tared eleven feet six inches, was found dead at Cawood on March 31, 1905. It may here be mentioned that in these animals the upper termination of the windpipe or trachea is directly prolonged into the nasal passages; while the spiracle is valved, shutting immediately after cessa-

tion of respiration. Thus the whale is safeguarded against being drowned, and can with impunity open his mouth to feed below the surface, just as a crocodile or alligator can. In the common porpoise the *velum palati* forms a true curtain hanging well down the back of the mouth, while the trachea plays through a hole in the palate surrounded by a compressor muscle. The spiracular valve of the porpoise has been happily described by Frank Buckland as "a combination of the conical stopper of a wine decanter with the action of the bolts of a door lock."

THE PRÉVOST SQUIRREL.

“Intusschen biedt dit diertje, volgens de landen die het bewoont, standvastige verscheidenheden aan ten opzigte der min of meer in het oog vallende wijzigingen dezer drie hoofkleuren, zoodat men genoodzaakt is, vier zoodanige verscheidenheden aan te nemen.”—Prof. Schlegel on Prévost’s Squirrel, 1872.

The foregoing remarks of a distinguished Dutch naturalist on that most beautiful of all squirrels, the lovely *Sciurus prevosti* of Malaysia, well indicate its great range of colour-variation. Widely distributed, Prévost’s squirrel varies in several well-known phases, each according with wonderful precision with a special distributional area; while recent travellers have also found greybacked and black varieties occurring together in the *same* district. Indeed the student of mammalian coloration may well pause bewildered, not on account of the lack of material but from its very abundance, since every class offers something for consideration. Thus there is the black squirrel of North America, sable above, snow below—a smart little beast; Collie’s squirrel, a scheme of smoke and silver, being grey and smoke above with white underparts; the jelerang squirrel, dressed in soft shades of blackish brown and grey; and the curious changeable squirrel (*S. caniceps*) orange-

backed during December—March, uniform grey for the rest of the year. The handsomest of this handsome tribe is the Prévost squirrel of Malacca and the East Indies.

Prévost's squirrel (*Sciurus prevosti*) was first known from a specimen brought home in Sir Stamford Raffles's collection. This type specimen, as measured in skin, taped eight inches from the tip of the muzzle to the root of the tail, the tail itself measuring eight inches and one-third; the height at the shoulder was three inches and three-quarters. In compliment to Sir Stamford this form of Prévost's squirrel has been named *Sciurus prevosti rafflesii*. A specimen now before me is black above from the tip of the muzzle to the tip of the tail; the lips are whitish grey, the cheeks iron grey; the under parts are orange, separated from the black of the upper parts by a broad white band which extends over the anterior half of the thigh, and recalls the lateral line of certain antelopes. The tail tends to show brownish reflections, which are very much accentuated in some specimens in the writer's collection. This is the var. *sumatranaus* of the Dutch naturalists, who consider the true, typical *Sciurus prevosti* to be lustrous black above and on the tail, while the under parts are maroon-coloured and separated from the white of the sides by a narrow black band; the cheeks being white and not iron grey. The first-known examples (a pair) of the "true" Prévost's

squirrel, brought home by M. Diard from Malacca, are now at Leyden; but English readers may see specimens in the museums of Manchester and Liverpool. *Sciurus prevosti bangkamus* has the iron grey of the cheeks extended to the sides of the neck, and a narrower white lateral band; the type specimen was sent by Heer J. F. R. S. Van den Bossche, an old resident in the Island of Banca, to the Leyden Museum in 1861. A greyish phase (*var bornensis*) having the outside of the thighs iron grey, not white as in the three preceding forms, was taken by Diard, who obtained the three type specimens (a male and two females at Leyden) at Pontianak in Borneo.¹ Greybacked individuals have in recent years been taken on Mounts Dulit and Kina Balu. The late Mr. Whitehead in March, 1887, took two greybacked specimens at 1000 feet on Mount Kina Balu; in 1888 he obtained another greybacked and also a black *prevosti* at the same altitude on this mountain. A specimen of the black variety (*Sciurus pluto* of Dr. Gray) is used to illustrate the phenomenon of melanism at the Natural History Museum, while another is preserved at Liverpool. The fur of the so-called *Sciurus pluto* is dull red underneath, like dying embers in a lump of coal. In the New World this sable Prévost is paralleled by the dark variety

¹ See Professor Schlegel's valuable paper on East Indian squirrels in the *Nederlandsch Tijdschrift voor de Dierkunde* for 1863. One of the two *prevosti* in the British Museum before 1843 had the end of the tail "pale" = probably tinted with brown. They were said to have come from India, where the species does not occur.

of Gapper's squirrel (*S. leucotis*), though the American form is *entirely* black.

Prévost's squirrel soon becomes tame in captivity, and makes a very charming pet; specimens of the *var. rafflesii* (= *sumatrana*) are frequently brought alive to England. The first *prevosti* exhibited in the London Zoological Gardens seems to have been purchased on May 29, 1877; it came from Malacca. The present writer well remembers a very tame one living there in the now demolished Small Mammals' House. These animals are offered for sale by the London dealers, though they are by no means so well known as they deserve to be; advertisements of them occasionally appear in the all-embracing columns of the *Exchange and Mart*. Sprightly, inquisitive, and intelligent, Prévost's squirrel is well worth keeping; its handsome appearance and enterprising disposition render it a very attractive subject for study. Moreover, this animal's constitution is fairly tough, and with a little artificial heat in cold weather and good warm bedding it will come triumphantly through an English winter. No less than nine living specimens have come under the writer's notice at various times and in various places, and the results of his observations are herewith communicated.

The first point that attracts attention is the remarkable pseudo-musteline fashion in which this squirrel runs along a branch. The head is not raised, and the

tail, extended behind, forcibly suggests a weasel or marten on the prowl. *Sciurus prevosti* never carries its tail over its back like the common English squirrel, and even when feeding still trails it straight out behind, a plume of glossy sable or shining brown. These animals are fond of basking in the sunshine, squatting on a branch with arched back, toes drawn in, and tail dangling. They will lie in this attitude for half an hour at a time, motionless but wide awake; apparently the sable fur thus absorbs the maximum quantity of heat. On rousing itself the squirrel runs rapidly about, the nostrils twitching continually and the body jerking from side to side in an abrupt and irregular fashion. It descends head foremost, often by scrambling along the *lower* surface of a branch. If alarmed or puzzled at anything it utters a curious grating sound, which may be feebly imitated by rapidly running the fingers along the wires of a bird cage. When several are kept in adjoining pens the various captives become very noisy at twilight; on catching sight of a fellow-prisoner one of these animals will set up a loud and long continued squeaking, shrill in tone and rapid in utterance. Its companion immediately replies, and if several are kept together the noise is considerable. At twilight, these animals seem to remember that "beds are not made." Grasping a bundle of hay in their mouths they rapidly twist it up with their tiny paws, and retreating under their couch can be

heard rustling about in the interior as they make and remake their bed. When making their toilet, these animals groom the tail by passing it quickly through the paws, the mouth working on it at the same time. Prévost's squirrel, in spite of its charming exterior, is a sad bully. A large well-grown individual, which was kept with a pair of smaller ones subsequently purchased, used to tease the new arrivals most unmercifully, seizing hold of their tails and biting them about the lips and head. These tiresome animals also tormented a small mouse-deer, or chevrotain, that shared the same cage. A day or two after its arrival, the unfortunate chevrotain was found with its ears bitten and bleeding; it was also paralysed in the hind legs. Although this is an injury to which these little creatures are particularly subject in confinement, in the present instance the animal had doubtless been terrified by the squirrels, and, dashing violently about the cage, had received injuries which a few days later terminated in death.

A single pair of *prevosti* kept together without any cagemates are affectionate enough, smoothing each other's fur just as tiny foreign finches dress each other's plumage. At meal times, however, this mutual regard may undergo a severe strain. If both seize the same banana they wrest it from each other's jaws, gripping it firmly and squealing in shrill cadence. Prévost's squirrel soon becomes tame enough to eat from its owner's hand, and if allowed

a spacious outdoor cage will come running up to him to be fed. Individuals kept alone amuse themselves by running to and fro on the floor of their cage just behind the wires, or scamper helter skelter about their apartment, taking wires and branches, shelf and floor in a brilliant series of improvised gymnastics. In order to study them to the best advantage, such pets must be carefully fed; although they will eat the dry food supplied by the dealers, it is not the *best* diet. It must be remembered that Prévost's squirrel is largely *frugivorous*, destroying in its own country great quantities of durian and other fruit, and cleaning out even cocoanuts after biting a circular hole in them. Oranges, bananas, and figs are readily taken, and it is wonderful to note the rapid improvement effected by a fruit diet on newly-arrived animals purchased from the dealers. The coat becomes sleek and shining, and the maroon portions take a purple gloss; the strong, active animal bounces about its cage in the best of health, dropping to the floor with a resounding thud that speaks eloquently of its increased weight and high condition. These animals require a very large and roomy cage, in order to take sufficient exercise; otherwise they become liable to the fatty degeneration of the viscera so common amongst captive animals, the present writer having found several such deposits in the liver of this species.

A male Prévost's squirrel formerly under observa-

tion had been in poor condition ever since purchased; feeding on a diet largely composed of fruit effected considerable improvement. Six weeks before death, weakness (*paresis*) of the left foreleg was observed, though it still continued to climb about and take food as usual. The weakness increased, though apparently without pain, the squirrel being still able to climb thirty-six hours before its death, which took place on June 2nd, 1904. Post mortem examination revealed hemiatrophy of the brain, the right cerebral hemisphere being much wasted and about one-third narrower than its fellow. No convulsions were observed during the progress of the malady. This case seems to differ from ordinary "cage paralysis," being apparently due to a porencephalic state of the brain; cage paralysis, on the other hand, is due to a softening of the bones, mainly attacks the hinder extremities, and occurs chiefly in monkeys, lemurs, and carnivora.

It is not, however, as a pathological dissection subject, or even as a museum specimen, that this lovely squirrel should be studied. Its engaging manners and lively disposition cannot be demonstrated by a stuffed skin, nor by an anatomical preparation immersed in a jar of spirits. This animal almost more than any other treated of in this book, requires to be seen *alive* to appreciate its full charm. Equally with the great sable antelope and the handsome clouded tiger does the Prévost squirrel voice the romance of natural history; it is hereby cordially recommended to all lovers of strange pets.



COMMON CHINCHILLA.

Note the prominent eyes, the wide ears, and the broad semi-erected tail.

THE COMMON CHINCHILLA.

“Amongst others they have little beastes, like unto a squirrel, but that hee is gray, his skinne is the most delicate, soft and curious furre that I have seene, and of much estimation (as is reason) in the Peru ; few of them come into Spaine, because difficult to come by, for that the princes and nobles laie waite for them, they call this beast Chinchilla and of them they have great abundance.”—*The observations of Sir John Hawkins, Knight, on his voyage into the South Sea, An. Dom. 1593.*

Few, indeed, of the animals commercially valuable for their fur are so charming during life as the little creature so quaintly described by Sir John Hawkins. The common chinchilla (*Chinchilla lanigera*) is about the size of a large rat and measures fifteen inches in extreme length, of which five inches are occupied by the tail. The muzzle is furnished with very long whiskers ; the incisor teeth are broader than deep, and fronted with orange-coloured enamel ; the eyes are large and beautiful ; the wide ears are rounded and rather long. The body is rotund and compact, being supported on short legs and furnished with a somewhat bushy tail, which as a rule is carried semi-erect, as if actuated by a hidden spring.

The fur is very thick and exquisitely soft ; it is usually of an ashy grey hue, though white and even grey coloured varieties are sometimes met with. In 1846, a form of chinchilla with a shorter tail

was described from Peru ; it is at best doubtfully distinct from the present species. Cuvier's chinchilla (*Lagidium cuvieri*) on the other hand is quite a separate animal, and was perhaps the Copiapo of the older writers. It is as large as a rabbit, with long ears and tail, and occurs in Chili, Peru and Bolivia ; it is variously known as the lagidium, the lagotis and the Bolivian chinchilla.

The common chinchilla appears to have become known to Europeans soon after the Spanish conquest of Peru. Father Acosta in his "Natural and Moral History of the East and West Indies," published at Barcelona in 1591, gives as a locality "The Sierre of Peru." It appears at first to have been excessively rare, owing to imperfect knowledge of its haunts. Alonso de Ovalle even states ("Historical Relation of the Kingdom of Chili," Rome, 1646) that the Valley of Guasco was the only known locality for the Arda or ash-coloured squirrel. In 1776 the present species was mentioned by an anonymous writer (perhaps the Abbé Vidaure), while in 1789 Molina gave a good description of the *Mus laniger* in his account of the natural history of Chili, and related that the ancient Peruvians used to employ its fur in the manufacture of wool coverlets for beds and valuable stuffs. Although imperfectly known from trade skins which found their way into Europe via Santiago, Valparaiso, and Buenos Ayres, it was not until 1827 that the chinchilla was definitely described

by an English naturalist. In that year Mr. Bennett, Secretary to the Zoological Society of London, described an individual living in the Society's then infant managerie, and published a figure of it by Harvey. This animal—the first ever brought alive to England and perhaps to Europe—had been presented by Captain Beechey, and was soon afterwards followed by a second and larger individual said to have been brought from Coquimbo, the gift of Lady Knighton.¹ In 1831 Mr. Yarrell, the new Secretary, on the death of Mr. Bennett published an account of the anatomy of the chinchilla. Yarrell was justly esteemed as a careful and accurate dissector; he probably used one (or both) of the specimens which had been recently received at the Gardens. Dr. Lichtenstein, of Berlin, about this time also described the chinchilla, so that it was at last definitely and thoroughly introduced to scientific Europe. Both the Regent's Park specimens were preserved as late as 1838 in the museum of the Zoological Society, while another, presented to the National Collection by Alexander Collie, R.N., figures in Dr. Gray's Mammal Catalogue of 1843.²

The common chinchilla inhabits the higher Andes, ranging from the north of Bolivia to the south of Chili. A well-known haunt of these little creatures

¹ A museum specimen of the chinchilla, according to M. Deleuze, was preserved as early as 1823 in the collection of the Jardin des Plantes at Paris.

² See J. E. Gray: Catalogue of the Mammalia in the British Museum.

is the Despoblado, a barren table land extending N.W. to S.E. through Peru and Bolivia to Argentina, and situated between the Corderillas and the Andes at an elevation of 12,000 feet above the level of the sea. Scantly covered with yellowish-brown grass and stunted rhatany shrubs, these dreary wastes are subject to icy winds, driving snowstorms, and thick mist. Animal life is represented by a few mountain forms, such as Azara's dog and the curious *Colaptes rupicola*—a woodpecker that does not peck wood, but flutters in numbers about the mountain sides. Vegetable life is represented by gentians and grasses, while a few cacti and willow trees occur in the valleys. The chinchillas abound in this storm-driven and (literally) howling wilderness, living in holes like the rock hyrax of the Cape. They come out to feed morning and evening, and are said to swarm in hundreds in suitable localities, jumping over the rocks—grey like themselves—with considerable agility. These animals breed twice in the year, but owing to incessant pursuit are in some districts almost exterminated. The Indians snare them with horse-hair nooses; in the early part of the last century chinchillas were taken by means of the grison or grey-backed weasel.

The grison (*Galictis vittata*) is a sturdy muscular beast, resembling a small ratel or honey-badger. Young animals are whitish *above*, black *beneath*, showing a curious reversal of tints quite uncommon

in Nature; with age they gradually darken to iron grey. The grison is extremely active and intelligent, and even in captivity allows nothing to escape its persevering inquisitiveness. Pattering about its cage at a rapid pace on its stumpy legs, it continually sniffs at and inspects everything—delighting to be noticed, though no doubt ready enough to give an incautious observer a bite with its trenchant jaws. “That animal knows everything you say,” a dealer observed to the present writer in reference to a young individual afterwards sold to the London Zoological Gardens. It only needs a glance at such a wide-awake beast to realise what a terrible customer a trained grison would be in the hands of a native hunter. How the terrified chinchillas would scurry from their burrows like rabbits bolting from a ferret!

Captive chinchillas are as inoffensive as guinea-pigs, never biting even when handled, and spending most of the daytime in sleep. They may be fed like rabbits, and provided they are warmly bedded probably do not require the hot house temperature which the authorities of zoological gardens seem so anxious to give them. It must be remembered that chinchillas inhabit *Alpine* regions, otherwise their thick woolly fur would be useless to them. Beasts of hot countries are generally smooth-coated, and even the woolly fur of the Cape hunting-dog is not very thick. Besides, it has been found that many *tropical* animals do well (at least in summer) with out-door treatment;

it seems reasonable to suppose that under a similar *régime* the chinchillas would flourish quite as well as the hyraxes and armadillos so successfully exhibited in the open air in London and Paris. Normally tame even to stupidity, it is curious that the two classical specimens, presented to the Zoological Gardens in 1827-31, fought so fiercely that they had *nolens volens* to be separated. Those who have kept pet rodents, as squirrels or rabbits, will remember the occasional fights that take place amongst the meekest individuals, sharp bites being inflicted with an animosity quite at variance with their timid demeanour towards man. A female chinchilla, formerly living at the Zoological Gardens, gave birth to four young ones on May 21, 1875.

Pelts of the chinchilla figure largely to-day at the London fur auctions, from 5,000 to 80,000 being annually imported; the best skins come from the mountains of Arica. Formerly sold at the Commercial Sale Rooms in Mincing Lane, the pelts are now disposed of at the College Hill Rooms, fetching from six shillings to twelve pounds per dozen. There are said to be many Germans amongst the buyers.

The Abbé Molina long ago suggested that owing to the gentle nature of the chinchilla it might be reared in houses, repaying its owner for his trouble by the profit on the sale of its fur. He also stated that the woolly pelt of this animal was long enough

to be woven, citing in support of this assertion the ancient Peruvian workers. Modern furriers are nothing if not up-to-date, and a remarkable development of fancy farming was recently seen in France, where attempts were made to breed chinchillas for their skins. Indeed, it is said that the scarcity of these animals in the English market is due to this cause. Be this as it may, the present writer has had repeated cause to notice how few of these animals—only a pair or so every three or four years—have recently been on sale in this country; years ago they seem to have been abundant, no less than five specimens at once having been sent on approval to the London Zoological Gardens on July 31st, 1875. Unfortunately the experiments in France failed; this is the more regrettable since the price of a live pair being about five pounds, considerable expense must have been incurred in starting this novel industry. It may be interesting to recall here the instance of a certain would-be rich individual who during 1902-4 endeavoured to farm silver foxes for profit. The foxes were kept on an island; being thus safeguarded by a watery barrier they required no fence. Doubtless their owner looked forward to realising a small fortune. *Dissipatur in auras.* An exceptionally low tide having occurred without any provision being made against it, the four-footed riches of the fox-farmer scampered off to safety and the mainland!

THE GREAT ANTEATER.

Few phases of natural history are more interesting than the remarkable development during the last twenty years of the beautiful art of taxidermy. The contrast between former and up-to-date results is clearly recognisable on visiting the older museums, especially those on the Continent. From mere "stuffing" the science of correctly mounting a mammal or bird has advanced to a high degree of perfection, the contour of limb and pose of body being in many cases rendered with a wonderful correctness that doubles the value of the mounted skin. The early collections consisted of ghastly rows of stuffed mummies, goggle-eyed and distorted; the recent ones exhibit numbers of choice nature studies, true works of art. One may here specially mention the white-tailed gnus (black wildebeest) in the Leyden collection, the stuffed quagga at Amsterdam, the gerenuk antelopes at Paris; the valuable series in our own National Collection, secured largely through the efforts of the late Sir. W. H. Flower, will be familiar to many. Most (probably all) taxidermists employ the "old" though improved method of mounting the skin on a body of straw or tow stiffened by an artificial skeleton of wire; another process by

which the skin only is retained was employed many years ago by the late Charles Waterton, and warmly championed by the Rev. J. G. Wood.

Waterton's method consisted essentially of an absolute reliance on the pliability and elasticity of the half-dry skin. The mammal or bird was flayed and the skin treated with an alcoholic solution of corrosive sublimate. The skin was then filled with bran, and as it slowly dried was carefully manipulated by a pair of modelling rods. One of these was applied to the outside of the skin, the other to the inside through a hole left for the purpose. In this way the outlines of muscles and tendons were carefully reproduced; the skin when dry retained these, and the bran being shaken out there remained an exact *facsimile* of the living animal, remarkable for its strength and lightness, being hollow to the very toes. Any portion that might have been incorrectly modelled could be remade after softening with a jet of steam; thus the skin possessed considerable advantages over the rigidly-supported specimen of the "old" methods. Unfortunately the great length of time required for modelling¹ and the great skill which it exacted from the taxidermist militated greatly against the universal adoption of this method. Most of Waterton's specimens went on his death to Ushaw College. The National Collection

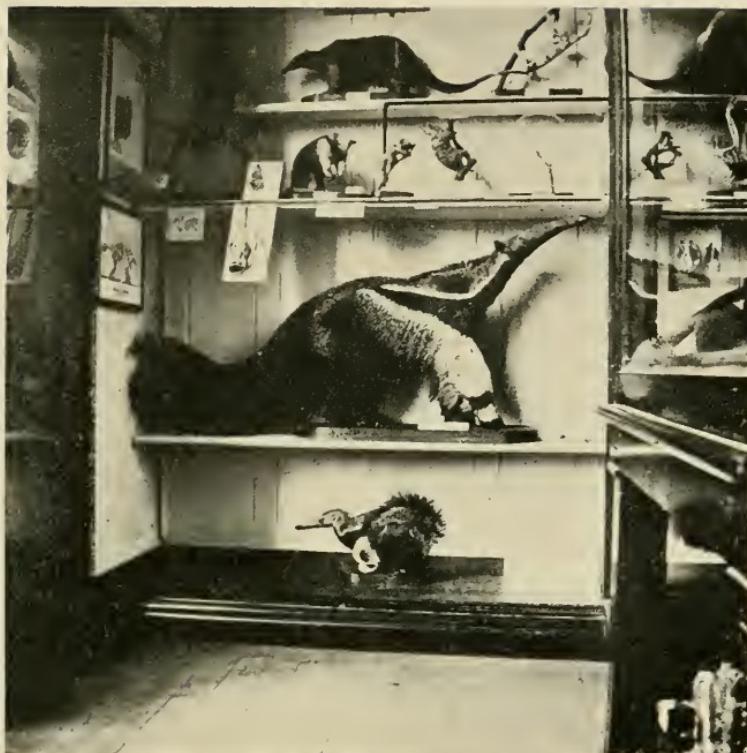
¹ A starling would take a fortnight to mount by Waterton's method.

however contains a young anteater modelled by him (seen at the bottom of the illustration) and presented to the Museum in 1860; by careful scrutiny of the photograph one can compare the results of the two styles side by side. It will probably be admitted that after all up-to-date mounting, though by the older method, gives results at least equal to those of Waterton.

The great anteater or tamanoir (*Myrmecophaga jubata*)—tamanduá bandeira and tamanduá assu of the Brazilians, yurumi of the Paraguayans—stands about two feet high at the shoulder, and measures about seven feet in extreme length. The head is small and strangely bird-like, being prolonged into a slender beak bearing the mouth at the extremity. The oral aperture is very small, barely admitting the finger, and the long purplish tongue flickers in and out of it like the tongue of a snake; *os angustatum in rostrum*, as Linnaeus observed. The eyes of the anteater are relatively minute, and the neatly rounded ears are also small. The body is sturdy, somewhat compressed, and supported on stout and shortish legs. The claws are powerful and strongly curved; the animal walks on the outer edge of the forefoot, thus preserving their points.¹ The soles of the hind feet are flesh-coloured, like those of a bear. A mane runs along the back and merges into the

¹ "Poor thing" said one good woman on viewing the incurved claws of the first anteater exhibited at the Zoo "see how he is cramped by being kept so long aboard ship!"

3 4 5 6



ANTEATERS.

1. Great anteater : note the conical shape of the body, caused in living specimens by the immense salivary glands filling up the hollows of the neck. The triangular "banner" on the shoulder and the sleeved arms are also seen.
2. Young anteater mounted by Charles Waterton. Note the relative shortness of the beak.
- 3, 4. Two varieties of the tamandua anteater (see p. 202 foot-note).
- 5, 6. Two-toed anteaters.

sweeping, vertically-haired tail.¹ The fur on the fore-legs is much elongated and directed backwards, so that the animal looks as if its wrists had been thrust through a pair of "leg of mutton" sleeves. The weight of an adult anteater is about sixty-two pounds.

In spite of its extraordinary appearance, the tamanoir is a fine handsome beast. Clad in a garment of grey mixed with black, its attire is smartened by a snow-edged sable band which, roughly triangular in shape, runs upwards and backwards across the shoulder to end near the region of the loin—hence the name of tamanduá bandeira, or banner anteater, applied to this species by the Brazilians.² The whitish fore-limbs are twice banded in glossy jet. The under parts of the body are blackish brown. In some specimens at any rate, the head is purplish grey, owing to the skin showing through the thin hair; similar instances are recorded amongst very different animals, such as eland and kudu antelopes, in which the hide of the body, denuded through age, also exhibits a bluish cast. Newly-born anteaters are greyer than the adults, and have but a scanty tail.

Occurring throughout tropical Central and South

¹ An anonymous essayist (? Broderip) has well remarked in *Household Words* for 1853 that the brush of the great anteater is "a peacock's tail without the gaiety, made of grey hairs instead of gaudy feathers."

² The triangular "banner" of the anteater will remind the student of the three-sided pennon borne by knights bachelor in the Middle Ages. The pointed end being cut off by the general in command, the pennon became square and the bachelor a banneret.

America, the great anteater is essentially a beast of the primeval forest, frequenting swampy regions near creeks. One would have supposed this preposterous looking creature to have been the last in the world to have any aquatic or scansorial habits ; yet it not only swims well, but even climbs with facility. It has a dislike to showers of rain, and is said if caught in the wet to stand still, holding over it its great tail as a natural and very efficient umbrella. The tamanoir sleeps during a good deal of the day, when its ever-useful brush serves as a counterpane ; the hairs springing from the upper and under surface of the tail (like fronds from the midrib of a fern) are excellently adapted for a coverlet. The South American Indians hunt the anteater for food¹ and occasionally themselves fall victims to the tremendous claws of their quarry. The anteater has two methods of defence—by rearing itself up bear fashion and rending its adversary to pieces, or by throwing itself on its back like a wounded hawk, thus leaving all four feet at liberty. Only a single young one is born at a time. The mother carries her quaint offspring on her back ; it accompanies her for many months and even after it has begun to feed on insects. These animals are said to take four years to attain adult size. The value of an anteater skin

¹ The late Professor Moseley relates that he once saw at Feira St. Anna, near Bahia, at least a dozen individuals of the allied *tamandua* anteaters offered for sale. The skulls of all were split open ; they were spitted on skewers and had been roasted ready for eating.

in the London market is said to be only about five shillings.

The tamanoir seems to have first been made known to Europeans by John de Laet, who, in his ponderous work on the New World, published in 1663, notices the animal (*Novus Orbis*, chap. 5, Book XV.). Piso ("De Indiæ utriusque re naturali et medicâ," folio, Amsterdam 1658, Chap. xxii.) describes the tamanoir as the "Tamanduà guaçu sive major," giving a fairly accurate figure of it feeding on ants with protruded tongue; the claws of the right foot are shown correctly turned in. The tamanoir and the *dodo* figure in the frontispiece to this work! The first living anteater sent to Europe was probably the animal which was kept at Madrid in 1776, and afterwards stuffed for the Royal Cabinet of Natural History at Madrid, where it still remained, in excellent preservation, in 1792. A fine example (fully adult judging from the measurements published by Pennant) was preserved in the famous museum of Sir Ashton Lever. At the sale of the collection it figured as lot 2300 "An extremely large and fine specimen of the Great Anteater of South America, *Myrmecophaga jubata*," and was disposed of on May 27, 1806, for £12. This may have been the specimen obtained by Mr. Bullock for his private museum and afterwards acquired in 1819 for the National Collection. It is doubtful whether the great anteater was ever kept in Lord Derby's

menagerie at Knowsley Hall ; the ambiguous statement of an anonymous essayist in 1860 that Lord Derby "anticipated the Zoological Society with the great anteater" may refer to museum specimens.

Be this as it may, some two years after the death of Lord Derby in 1851, there might have been seen in London a window-bill in a small shop inviting the public to see an ANTITA at a charge of sixpence per head, children half-price. The mysterious exhibit was a young tamanoir, about five months old, and as big as a Newfoundland dog, the only survivor of four which had been taken by some poor Germans in the wilds of Brazil. The captors had arranged to divide into two parties bound respectively for London and Paris, each section taking with them a couple of tamanoirs. The anteaters destined for Paris unfortunately died before reaching France, and of those intended for England one fell prematurely into the hands of a Rio Janeiro taxidermist. The survivor was exhibited to the public at No. 17, Broad Street, Bloomsbury. Kept behind a curtain and railed off from the spectators, it inhabited a deal box carpeted with straw and surmounted by the stuffed skin of its departed comrade. The anteater was fed on eggs (of which it took fifty a day) and with milk, chopped meat, and soup. Mr. D. W. Mitchell, then Secretary of the Zoological Society, after repeated overtures managed to secure the animal for the Gardens. Installed in a special glass

house, it became the rage of London ; quite early in the day crowds of visitors could be seen streaming towards the anteater house, and even standing *en queue* at the door. The Press devoted considerable attention to it. *Household Words* for Oct. 15th, 1853 (edited by Charles Dickens), contained an article on the "Brazilian in Bloomsbury;" and *Punch* published a long, amusing, and really very able article on "The Fashionable Zoological Star." A female anteater was also obtained for the collection about this time. On November 14, 1865, the first living anteater seen in France died from the combined effects of pleurisy and pericarditis ; M. Pouchet, who afterwards dissected it, states that the pericardial sac contained a tumblerful of effused sérum.

A remarkable fact was noticed in the domestic economy of these captives. Although supposed to live on ants, these strange creatures in confinement absolutely refused to touch them!¹ The classical specimen kept at Madrid was maintained on a daily ration of four or five pounds of raw minced meat ; those in London subsisted on a Quixotic diet of animal and vegetable substances mashed into a pulp. The tamanoir will take fruit or—*horribile dictu*—a dead mouse ; yet it

¹ Mr. Broderip has suggested that the animals disliked the formic acid contained in the true ants with which they were supplied, the termites, or "white ants" of their native forests being very different insects.

refuses mealworms, so greedily eaten by almost every menagerie animal from galago to Prévost squirrel. Raw eggs, milk, and the intestines of rabbits formed the daily *menu* of one anteater; strips of raw beef with milk, egg, and *arrowroot* nourished another; beef and egg "melées ensemble" supported a third, of which the writer recently inquired at the Jardin d'Acclimatation. Not only will these delicate beasts eat such food, but they *thrive* upon it. Dr. Palin, on October 4th, 1867, presented an anteater to the London collection; although then in poor condition, it lived fourteen years in the menagerie on a manufactured diet, succumbing at last, not to gastric troubles, but to inflammation of the larynx, the thymus gland being also markedly enlarged. Indeed, the throat rather than the stomach would seem to be the *calx Achillidis* of the great anteater; for another individual which the Hon. L. S. Sackville West presented to the Zoological Gardens on September 7th, 1877, died four years later from a severe cellulitis, caused perhaps by the November fogs. Inflammation was found to have set in around and within organs vital to the anteater above other beasts—the great submaxillary glands which secrete the all-important saliva. A fine coloured model showing the macroscopic anatomy of these structures will be found in one of the new galleries of the Jardin des Plantes; while an actual dissection of the neck and glands is preserved

in the Royal College of Surgeons' Museum in London.¹ It may here be mentioned that a valuable memoir on the eye of the great anteater appeared in the *Journal de l'Anatomie* for November-December, 1867, written by M. George Pouchet and Dr. Theodor Leber, Chief of the Clinic of Professor Graefe, the celebrated oculist of Berlin.

Thus much for the physical characters of the tamanoir; as for its psychical attributes it may be mentioned that practical naturalists have found it, like the mild-eyed giraffe, to be an uncertain and even dangerous pet. The late Mr. A. D. Bartlett has described how he went to inspect an anteater that was kept loose in a garden, and how the shaggy brute unexpectedly turned on him, forcing him to beat a hasty retreat; an animal that is said to be able to kill a jaguar and rip open a dog is no despicable antagonist. Taken young, however, this quaint creature can be readily tamed, and will even whine to be caressed; it shows marked attachment to individuals, and frolics like a puppy. A very fine and tame pair of anteaters were living in Herr Adolph Nill's private collection at Stuttgart some years ago, and the female gave birth to a young one—probably the first ever born in captivity.

¹ Contrary to the error promoted by Buffon, the saliva of the anteater is not more viscid than that of other animals. It dries rapidly without leaving any stain on the object to which it has been applied. Unfortunately, Charles Waterton in 1835 revived the error by stating that the saliva "when wet is very clammy and adhesive," a conclusion with which, after experiment, the present writer cannot agree.

The bizarre appearance of the anteater is heightened during life by its odd movements. A captive tamanoir will stand reared up with its forefeet planted on the ledge just inside its cage, and sway its bird-like head to and fro like a weird creature in a dream. It seems, indeed like several beasts rolled into one, with a strange individual eerieness thrown in! Sitting straight upright, its black chest and white-patched arms recall the sable pelt and snowy chevron of the Himalayan bear, and remind one of old Dampier's mention of the "bear that feeds on ants." Viewed from behind, when standing with upraised head, the elongated muzzle and arched back simulate the long neck and hump of a camel; while the velvety black coat, mixed with grey, faintly recalls a Malayan tapir! When searching for food, the anteater noses about in the straw with a rapid, nibbling movement of the tiny lips, just as a stork or ibes probes mud for worms. When reclining on its couch, it carries its preposterous head with absurd dignity, and the tiny eye has a sober appearance which, with the stubby mane, suggests the face of some respectable cab horse!¹ The anteater cleans its delicate muzzle by rubbing it on the bent forearm; the forefoot has some prehensile power, and small objects can be grasped between the long claws and the sole of the foot—thus opposable like the human finger and thumb.

¹ Punch hit off this expression admirably in a certain cartoon in which the anteater, wearing a Jonathan hat, plies its tongue amongst the industrious niggers.

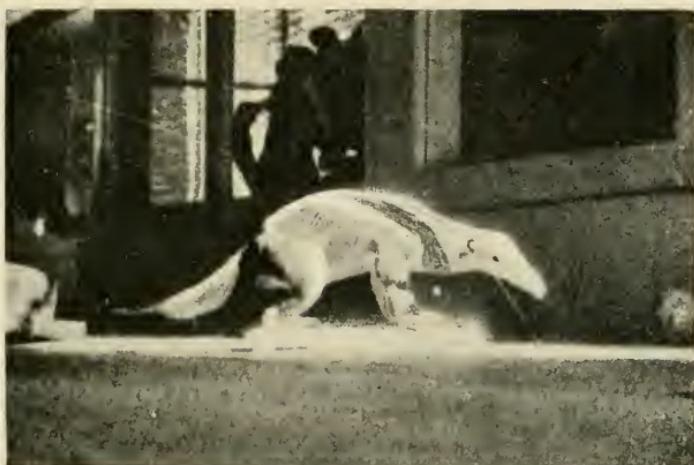
A pair of young anteaters living in the Regent's Park collection in 1904 were very active and playful. Fast asleep at 10 a.m., by mid-day they had become active, tumbling about in clumsy sport as they sawed the air with their huge claws and made absurd grabs at each other's ultra-Roman noses. One of them played kitten-like with its comrade's tail; the two raised their uncouth heads high in the air and padded about their cage, the shaggy coats rustling sharply on the carpeted hay. They took milk readily, churning it into froth as the long purplish tongues flickered wormlike in and out of the basin.¹ Driven back by their keeper when he entered the cage, they stood solemnly swaying their bodies to and fro like bears, or indeed like elephants, to which beasts their long nightmare snouts and habit of blowing audibly gave them a superficial resemblance.²

Specimens less than one month old are seldom, if ever, brought over alive, so that naturalists in Europe have little opportunity of studying the habits of very young individuals. A photograph of Herr Nill's anteater at Stuttgart, taken at two days old and exhibited on January 19th, 1897 at a meeting of the Zoological Society, excellently rendered the bird-like head, bear-like body, and plumeless tail of

¹ Sir Walter Elliott, in describing a short-tailed pangolin "anteater" (*Manis pentadactyla*) when drinking, remarked that it darted out its tongue so rapidly "as to fill the water with froth."

² The worthy Père d'Abbeville ("Mission en l'Isle de Maragnon") states that the "barbari" described the anteater as a beast as big as a horse, with a pig's head, dog's ears and a proboscis—not so bad for Indians!

the little creature. It reclined quite gracefully, lying partly on one side; the eye was closed, the mouth was open: the beak was short, and the ear remarkably prominent. A very young anteater (now preserved in the Artis Museum) was examined in 1902 by the writer; it measured about 25 inches from the tip of the snout to that of the tail. The general body colour was light grey. The mane was indicated by a scanty line of grey hair which ran along the back to merge in the upper edge of the tail, which entirely lacked its sweeping plume. The remainder of the tail was blackish. The insides of the limbs and the under parts—doubtless faded in drying—were of a pale brownish flesh-colour. The snout of the young anteater, and especially of embryos, is relatively shorter than in adults. A figure now before me of a female embryo in the Jardin des Plantes Museum exhibits perfectly the shortness of the muzzle due to immaturity, while the absurd horse-like expression above-mentioned is also clearly recognisable. An interesting and very instructive series of anteaters of various ages is preserved at Amsterdam, while several valuable specimens are in the Liverpool collection. As illustrating the great rarity of very young examples, not only in zoological gardens, but also in museums, it may be mentioned that as late as 1874 the embryo preserved at the Jardin des Plantes was actually said to be "*unique sans doute dans les cabinets d'Europe.*"



YOUNG ANTEATER.

in the Artis Museum, Amsterdam. Note the relatively short beak and the plumeless tail. The shoulder and arm stripes have appeared, but the animal being in direct sunlight seems paler than it really is. The hat shown in the photograph indicates the size of the specimen.

THE HAIRY ARMADILLO.

The “open air treatment” so strongly advocated for human invalids has of recent years received a humbler yet interesting application in the improved methods adopted for the exhibition of living animals. Thus, in the Amsterdam Zoological Gardens there are roomy aviaries, where the scarlet ibises glow like fire against a background of living green¹: in this collection an excellent system is also adopted, whereby the burrowing animals—armadillos, prairie dogs, wombats—are allowed to tunnel in the earth without being able to escape. The hairy armadillo was most interesting to watch as it scuttled about on its improvised pampas apparently quite at home, though under a northern sky. Indeed, this animal is very interesting under any circumstances, as it is proposed to show in this Essay.

The hairy armadillo (*Dasyurus villosus*)—called peludo in Argentina—measures about 16 inches in length, and is a most extraordinary little creature, being mailed all over its back with a jointed carapace that forcibly recalls the harness of the armadillo woodlouse or “slater” to be found in every garden under stones or rotting wood. The blunt, conical head of the peludo is helmeted with a scaly morion: the tail is also encased in bony mail. The under

¹ Renshaw: “The Amsterdam Zoological Gardens.” *Zoologist*, June, 1904.

parts are soft, flesh-coloured, and clothed with coarse hair—probably the remnants of an original furry covering which still persists on the upper surface of the allied *Dasyphus vellerosus*. The claws of the armadillo are strong, broad, and sharp—well suited to such a miner as the present species: the teeth are simple in structure like so many pegs and are remarkable for being devoid of enamel in the adult. The armour on the back is composed of bony plates set in the skin and covered with a thin epidermis: newly born animals have the mail soft and white like the pupæ of beetles. At eight weeks young peludo are nearly as big as their parents: one which was born in London on September 3rd, 1831, weighed no less than 52 oz. 2 drachms at its death on November 16th following.

The hairy armadillo inhabits the pampas of Argentina. One of the most adaptable of beasts, it is often abundant near human habitations and even *increases* with increasing population. Astute and versatile to the very tips of its claws, it is more than able to take care of itself; with a pliability that puts the famous Vicar of Bray very far in the shade it flourishes where other armadilloes, its less plastic congeners, dwindle yearly to extinction. Does its native heath remain a wilderness? It continues its daylight habits. Does man also share its haunts? It becomes nocturnal. Accommodating and omnivorous, it hardly refuses any food



HAIRY ARMADILLO.

Note the armoured head, shoulders and back, contrasting sharply with the defenceless underparts. A thin covering of hair is seen on the jointed carapace. The conical snout is said to be used as a drill in boring for earthworms.

from mice to maize seeds. Living prey or putrid carrion¹, fragrant clover or ugly snake, all come alike to the hairy armadillo, whose very gait spells business-like activity as it trots over the pampas, inspecting every object in its path with diligent scrutiny, sniffing over it like a terrier, and expelling the air from its nostrils with vigorous puffs. This armadillo climbs well on occasion and swims with ease; but its chief accomplishment is digging, when it sinks into the earth as by magic, and if not taken at once is quickly lost. The late Charles Waterton confessed to having spent three-quarters of a day in digging out one of these little edentates! If pursued by dogs, and unable to burrow, it rolls itself up, presenting to the teeth of its assailants nothing but an unsatisfactory globe of bony mail, jointed like the tail of a lobster, and from its mere bulk exceedingly slippery. The various feats of the peludo are all the more remarkable since though it may dig like a mole it is almost as blind as that animal; its hearing, however, is acute enough. During its hours of repose it sleeps in a self-constructed burrow, shivering at intervals in the peculiar manner also affected by picarian birds, such as toucans and hornbills. Two young appear to be the normal number in a litter; they are born blind.

¹ The South American pampas now supports eighty million sheep and horses. The peludo feeds on the carcases, and being unable to tear open the raw hide, sagaciously levered its way under the dead animal and tears through the skin, rotten through contact with the earth.

The hairy armadillo has in recent years been frequently imported alive into England, some two dozen individuals in all being annually advertised for sale by the various dealers.¹ The price apiece ranges from thirty to fifty shillings. From their marked intelligence and activity, these animals are always attractive exhibits for zoological gardens, and many amusing remarks are made by "the man in the street" as he watches them trot round their yard, nose on ground, like hounds on scent. Armadilloes are quite hardy, and, if *warmly bedded* with plenty of good hay or straw, *acclimatised* specimens may be safely kept without artificial heat during the winter. The food problem is easily solved, since, like coati-mondis, armadilloes will eat almost anything. It is absolutely necessary to pave the floor of their outdoor yard (they ought always to have one) with stone or some other impermeable material, since they will burrow into an earth floor and be lost, and they are quite capable of wrenching aside badly laid bricks. Every corner must be well secured and the yard strongly fenced with stout railings. Wire netting fastened with staples is a poor barrier for an armadillo, which will probably wedge its conical snout under the netting, and then wrenching away with its armoured head and shoulders burst it open by ripping out the staples. Similarly the railings must be

¹ The author remembers a batch of five offered for sale together in Liverpool some two years ago.

unclimbable lest the captive scale them, scrambling or rolling nonchalantly down the other side. Armadilloes are fond of basking in the sun ; when asleep they lie either on the back or on one side in a semi-contracted posture. They require plenty of room for exercise and water to drink ; this last must be kept in an unspillable vessel. These animals soon become tame enough to be picked up. Like chinchillas—*longo intervallo!*—they have never been known to bite, though they may inflict scratches—doubtless accidental—if carried about. A hairy armadillo was born at the London Zoological Gardens on May 2, 1875; two more on May 16, 1876; and two others again on August 6, of the same year.

THE TASMANIAN THYLACINE.

Across the zoological history of the nineteenth century one may well write the word "extermination"; for as Omar destroyed the priceless treasures of the Alexandrian library so have others robbed the world for ever of many beautiful and interesting animals. Nevertheless, the word "preservation" may eventually be inscribed upon the record of the *twentieth* century; on general principles one may well applaud the satisfactory supervision which now ensures that as far as humanly possible the zoological riches of the world shall not be as aimlessly squandered in the future as they have been in the past. The preservation of *destructive* beasts, especially those which prey on the stock of the farmer, is however a difficult problem. Thus, even the Cape hunting-dog has its due place in nature; one must not, in view of its bloodthirstiness, lose sight of the fact that, as much as any quagga or dodo, if once gone it is gone for ever. Another case in point is that of the thylacine of Van Diemen's Land—the *Tasmanian* thylacine, strictly speaking,



THYLACINE.

Note the curious resemblance to a dog; also the length of neck and tail, and the slenderness of the body. In the bush the wasp-like stripes may be protective, simulating the fronds of ferns. Note that the ears of the thylacine are erect, and even cocked slightly forward, though it has been said that this animal never erects its ears. The rudder-like tail is seen to be rigid, like so much iron. August, 1904.

since the bones of an allied species have been found in the superficial deposits of Australia.¹

The thylacine (*Thylacinus cynocephalus*)—tiger wolf, zebra wolf, and zebra opossum of the colonists—Tasmanian wolf of some writers—stands about eighteen and half inches high at the shoulder and tapers about forty-five inches from the tip of the muzzle to the root of the twenty-inch tail. The head is squarish, relatively large, and strangely dog-like; but the *muzzle*, as seen from the front, is markedly attenuated between the widened cheeks.² The nostrils, in life, are separated by a cleft, sharply defined as if cut with a knife. The body is somewhat slender, and supported on rather stoutish limbs; the thylacine, like the hyæna dog, has no hallux or “great” toe. The tail is very curious, being naked and compressed laterally, thus reminding one of the caudal appendage outlined by Cuvier in his restoration of the fossil *Anoplotherium commune*; indeed, M. Geoffroy long ago suggested from the form of the tail that the thylacine might be aquatic! The ground colour is greyish brown tinged with olive (deeper over the

¹ Portion of the left ramus of the lower jaw, and also a molar tooth of the Australian thylacine (*Thylacinus spelæus*) were presented many years ago to the Royal College of Surgeons' Museum, by Count Strzelecki. They were found in the Pleistocene deposits of Wellington Valley, and are mentioned in Sir Richard Owen's account of the fossil mammals in the museum.

² Since the above was written the author finds that the Dutch naturalist Temminck had similarly remarked: “Museau très comprimé à chanfrein arqué.”

back); the loins are marked with about sixteen black bands arising from a line running along the spine. One of these bands is frequently double; young animals are darker than their parents, judging from the family group mounted in the Liverpool Museum. The muzzle is purplish-black during life; on each side of it and on the chin are a few white hairs. In spite of its pseudo-canine appearance the tiger wolf is a true marsupial like the kangaroo; the pouch, however, opens backwards and the young ones scramble into it upside down. A male which died in London in 1885 weighed 33lbs.

The thylacine was discovered soon after Tasmania had, in 1804, been exploited as a convict settlement; the names Zebra Wolf and Zebra Opossum were already in common use when on April 21, 1807, Sir Joseph Banks communicated to the Linnean Society Mr. G. P. Harris' "Description of two new species of *Didelphis* from Van Diemen's Land." The descriptions were accompanied by sketches by Mr. Harris¹ depicting a thylacine in a sitting position (apparently drawn from life) and also a Tasmanian devil discovered near Hobart Town about the same time. Two thylacines only—both males—had at that time been secured; the type specimen lived but a few hours, having been taken in a trap and thus injured internally. It was remarkable for its low

¹ Not *Cornwallis* Harris, who at this date was a child only twelve months old.

guttural growling, for its stupid ferocity, and for its habit of continually drawing the nictitating membrane over its eyes. "Ears rounded, erect, and covered with short hair" says Harris decidedly; this point is confirmed by examination of menagerie specimens, although a wellknown naturalist has stated that the tiger wolf never pricks its ears.¹

The type specimen figured by Harris is no longer in existence: it would be interesting, however, to know whether it was the same individual which in 1812 was exhibited in Bullock's Museum as a "thylacine or Zebra Opossum, the only known specimen in any museum." Now the animal which Harris trapped was clearly immature, as shown by Temminck's comparison with an adult skull in the Leyden Museum; besides, at a scientific meeting held in London on June 8, 1824, it had been independently noticed that Harris' description of his specimen did not in the number of molar teeth correspond with a thylacine skull, certainly adult, then before the meeting. Temminck has distinctly told us that there was a smallish specimen in the Linnean Society's Museum in 1824; Bullock's collection was sold by auction in 1819, and the Linnean Society is known to have been a purchaser at the sale, having bought the specimen of the rare black emeu. Since, however, the type thylacine

¹ The remains of a prickly anteater or echidna were found in the stomach.

no longer exists, speculation on its history seems useless. The Leyden collection in 1827 included two skulls of the thylacine and also a pair of adult animals; these most interesting specimens described by Temminck are still (1905) in the Museum. In 1827, also, another thylacine was in the cabinet of "M. Brocks" (doubtless Mr. Joshua Brookes, whose museum was sold in 1828-30). This specimen is probably lost. Finally, in 1839, the Zoological Society's Museum had two stuffed thylacines, one presented by Mr. Charles Barclay and the other by Mr. George Everett.

The gradual colonisation of Tasmania rendered the thylacine an object of interest to the settlers, and especially to those who kept sheep; their interest, though deep and fervent, was by no means of the academical order. Widely distributed throughout the rocky glens and mountains of the island, the tiger wolf abounded in the colony, preying on the brush wallabies and similar quarry, and braving with impunity the frosts and snows of this austral Switzerland. The normal range of the thylacine extends up to at least 4,000 feet; it is a *mountain*, indeed *alpine*, species—a fact not sufficiently recognised in text books. Some natural histories describe this mountain dweller as frequenting the shore, apparently from confusion with the Tasmanian devil which Harris really observed in such situations. It would have been interesting to have compared the thylacine

with the strand wolf or fuscous hyæna which in the old days patrolled the beaches of Cape Colony ; but on examination of *Harris's original account*, there seems to be no reason whatever for considering the tiger wolf as a littoral species. The statement seems to have been copied by various compilers from one another, the error flourishing like a green bay tree in spite of Mr. Ronald Gunn's strong protest in the "Annals of Natural History" for 1838.

An undesirable trait in the character of the thylacine was the ghastly readiness with which it took a fancy to live mutton, like the kea parrot of New Zealand. Ranging the hills under cover of night, these marsupial hounds attacked the flocks of the settlers with a bloodthirsty readiness comparable only to the fell attentions of the African wild dog ; happily the thylacines did not hunt in packs like the brindled furies of the Cape, but singly or at most in pairs. The stockowners soon found the tiger wolves a very serious nuisance. It was impossible to poison them, for they never returned to the carcase, but preferred to kill fresh victims ; so that a dead sheep doctored with strychnine was much worse than wasted. When hunted with dogs the thylacines proved tough customers ; old males would stand at bay, able and more than willing to snap right and left at the half-hearted dogs, and more than a match for several of them at once. Indeed it almost seems that Harris' old-fashioned trap baited with kangaroo

flesh could hardly be improved upon ; it was found that though impossible to poison it, the tiger wolf could readily be taken alive in snares. Although cordially detested by the settlers the thylacine long flourished in the colony. In 1838 it occurred thirty miles from Launceston, and Mr. Ronald Gunn, who presented two specimens to the British Museum, records that it was then quite common at Woolnorth, in the extreme north-west of Tasmania, and in the Hampshire hills, twenty miles from the sea. The naturalist will readily picture a couple of thylacines bounding through some moonlit valley—silhouetted in sable on a field of silver, like the spectral hounds of story ; and the terrified sheep scudding like fleecy clouds before the grim figures of the destroyers.

Mr. Gunn seems to have taken a special interest in this animal, and Science is under a great obligation to him for his valuable donations of material to various institutions. Previous to 1843 he gave two thylacines to the British Museum ; in 1846 he presented the skeletons of a pair to the Royal College of Surgeons ; in 1850 he forwarded to England a female and three young ones as a gift to the Zoological Gardens. These last formed the subject of a paper by Dr. Gray in the "Proceedings of the Zoological Society"; a fine drawing founded on these specimens—the first ever brought alive to England—appeared in Joseph Wolf's "Zoological Sketches." Two years later Mr. Gunn, co-operating

with Dr. Grant, of Launceston, sent a pair of immature thylacines to the Regent's Park collection. They had been snared on the St. Patrick's River, and the female at least was fairly tame. Shipped on the barque "Stirlingshire," they arrived in London in splendid condition; Captain Gwatkin had done his duty well, and no doubt the twelve fat sheep thoughtfully provided for their consumption *en route* had contributed materially to this result. The male seems to have died previous to 1856, for in April of that year the Zoological Society purchased another example—doubtless to fill the gap. Both the thylacines sent by Mr. Gunn in 1852 died before reaching adult age.¹

In 1868 the thylacine, owing to constant persecution, had been extirpated from the more settled districts of Tasmania, though it still abounded in the wilder and less accessible regions. Mr. George Masters, Assistant Curator of the Australian Museum at Sydney, having collected a series of Tasmanian vertebrates, brought back with him skulls of what Mr. Krefft asserted to be a new species of thylacine—the "Bull-dog tiger" (*Thylacinus breviceps*) having a shorter skull and larger teeth than the typical or "Greyhound tiger." A copy of Mr. Krefft's paper on the Tasmanian fauna having been presented by

¹ Attention is drawn to this list of menagerie specimens, as a well-known naturalist has made the amazing statement that the pair of thylacines presented to the Zoological Gardens in 1849 (*sic*) have never been replaced.

the author to the Royal Society of Tasmania, Mr. Morton Allport at a meeting held on July 14th, 1868, dissented strongly *re* the new "species" of thylacine, saying that he had examined over fifty specimens and that he still held to the view that but one species existed in the colony. No distinct locality had been assigned to the "bull-dog tiger" nor had it ever been denied that the two "species" interbred freely. Moreover, a casual visitor to the Society's Museum volunteered the information that of the pair in the collection the male was a "greyhound" and the female a "bull-dog." *Rem acutetigit.* The differences in the teeth and skull are in fact sexual only; Mr. Krefft's "new species" vanished like a puff of smoke.

In 1871, a new zoological "sensation" became current. An unknown animal—stated to be a "tiger"—was seen in Queensland by Mr. Reginald Uhr, afterwards Police Magistrate for the St. George district, when on mounted duty. The thirteen year old son of Mr. Sheridan, Police Magistrate of Cardwell, Rockingham Bay, had a more startling encounter. Being out at dusk one evening with a small terrier, the dog took up the scent from a piece of scrub, and, barking furiously, followed up the trail till half a mile further on it came up with a beast as big a dog lying in the grass. It had a round face like a cat's, and a long tail; the body was striped from the ribs under the belly with yellow and black.

The dog pluckily flew at it, but was thrown. Young Sheridan approached to about a yard's distance from the beast and fired, wounding it in the head. The mysterious animal ran up a leaning tree, but the dog barking, it became savage, and rushed down first at the dog and then at the boy, who "got frightened and came home." From the boy's description, this beast can hardly have been anything but a thylacine; the banded wallaby kangaroo is certainly striped on the back; but it is a West Australian species of small size and timid disposition, and very unlikely to be able to throw a terrier.

There are, moreover, other reasons for supposing the animal to have been a thylacine. In 1872, Mr. Hull's party, when engaged in surveying on the Murray and Mackay Rivers, were startled one night between eight and nine p.m. by a "roar." Taking their guns, they reconnoitred, but without result; next morning, however, they found, perfectly imprinted in the soft ground, the track of a *four-toed animal with non-retractile claws*. Mr. Hull measured and sketched the spoor; the figure reproduced in the "Proceedings of the Zoological Society" for 1872 appears to be a typical thylacine foot-print. Mr. Walter Scott, of Cardwell, writing to the Society, mentioned that in 1864 one of his bullock drivers had stated that he had seen a tiger; but the man being a notorious liar, he had not believed him.

The Tasmanian skin hunters included the thylacine amongst their quarry, and as late as 1880 hawkers used to purchase the pelts from them to sell in Hobart Town. In 1883, however, it was thought that the animal had become utterly exterminated. If so, the male specimen then living in the London Zoological Gardens was of priceless (scientific) value, being the last of his race; for the wild tiger wolf was utterly unknown outside of Tasmania. The Queensland animals had not been heard of again.¹ However, Mr. W. L. Crowther, of Launceston, was able to assure the Zoological Society that the thylacine was not finished; and a nearly adult pair, purchased from him, arrived at the Zoological Gardens on November 14, 1884. These animals were in excellent condition, and were placed in the end cage of the row of bear dens facing south west, where the present writer well remembers them. Their keeper, a veteran in the service of the Society (his portrait over the title of "the bearward" illustrates one of Mr. J. A. Shepherd's clever articles in the "Strand Magazine") said that the thylacines were fed on rabbits. In spite of their great rarity (the tiger wolf being as a species raised from the dead) no photographs of them

¹ One cannot accept the testimony of Mr. Robert Johnstone as proving the continued existence of the thylacine in Queensland. The fawn-coloured animal with deeper markings and a long tail, which he saw in a tree forty feet from the ground in the coast range scrub of Carlwell, was probably a tree kangaroo: the rounded head *without visible ears* seems also confirmatory of this suggestion. On being disturbed, the creature jumped to a tree about ten feet off, which it descended tail first.

appear to have been taken; a special inquiry made in London for such photographs proved fruitless. In 1885 the old male thylacine died; it was very fat and exhibited no apparent cause of death. Its anatomy was carefully investigated; probably it was the first specimen ever dissected in England. The male of the pair purchased from Mr. Crowther died on February 5th, 1890.

Thanks to the liberality of donors in past years when the species was abundant, the various museums are fairly well off for preserved examples of the thylacine. A most interesting group (male, female, and two young) well mounted and exhibited, is in the Liverpool collection: a stuffed example is also preserved at South Kensington. The National Collection also contains some valuable spirit specimens of viscera, brought home by the "Challenger" expedition and dissected by Dr. D. J. Cunningham, whose memoir on "Some points in the anatomy of the Thylacine, *Cuscus* and *Phascogale*" will be found in the fifth volume of the "Challenger" Reports. A thylacine under the name of "New Holland Dog" figures in the list of spirit specimens in the Museum of the Royal College of Surgeons in 1859. This institution besides the pair of skeletons presented by Mr. Gunn in 1846, also possesses several other osteological trophies of the thylacine.

A male example of the present species was

purchased by the London Zoological Society on March 26th, 1902, being one of four then in the possession of Carl Hagenbeck, the well-known wild beast merchant.¹ The writer has spent some time in studying its movements and, while there was yet time, took several photographs from life, one of which appears in this book. The value of such life studies is apparent in view of the many inaccuracies perpetrated on the tiger wolf by artists and taxidermists. The old naturalists called it the "dog-headed thylacinus" from the alleged mastiff-like stoutness of the jaw and head; but a careful study of the *living* animal shows that the head is much more slender than one would have supposed from illustrations in books, and the writer possesses one photograph taken "full face" in which the muzzle appears of almost snipe-like attenuation. The tail again is rudder-like, as already mentioned, not *curling above the beast's head*—an atrocity actually perpetrated in a work of some standing; even Harris has made the tail too limp.² Freeman's figure in another book is really good and a very creditable presentment of a beast whose rarity much militates against any European artist figuring it from life. Schlegel's

¹ The two thylacines sent about this time to the Cologne Zoological Gardens, where they are still living, probably belonged to this batch.

² Far from being flexible, the tail of the thylacine is said to be so stiff that the animal cannot wag it; a photograph recently published in *Nature* shows an individual standing with the tail leaning against the ground like a bar of iron.

"Dierentuin" gives a good picture of a pair of thylacine perched on a lofty crag; it is perhaps the only figure extant which gives a true idea of the *mountain* habits of the species. Most pictures of the tiger wolf seem from the shortness and stoutness of the limbs to have been drawn from young animals. The adult thylacine is really a snaky beast, slim of body and attenuated generally; its half-starved appearance is doubtless heightened by the peculiar stripes, which simulate the outlines of ribs.

The Regent's Park thylacine is active during the early part of the day, taking exercise by running to and fro—sleeping apartment to outer yard and *vice versa*. In this pastime the head is held low to the ground, like a sleuth hound's on scent. Doubtless this is to enable the sense of smell to supplement that of sight in the glare of sunlight; Mr. Gunn has recorded that wild thylacine if out by day move at a very slow pace. The animal often pauses abruptly as if to reconnoitre, and then stands motionless for an instant with head raised, as shown in the illustration. It takes little notice of the attendant entering the yard, seeming half-blinded, like Harris's specimen, by the light of day. When the sun becomes powerful (10 a.m.), it frequently retires into its inner den and curls itself up dog-like, recalling Mützel's well-known figure in the Royal Natural History. It may however be seen in warm weather active at mid-day (11-30) trotting briskly about its yard. It is fond of

reclining to bask in the sun, a strange habit in a semi-nocturnal animal. In deep sleep it lies on one side fully extended; the uppermost ear remains erect, thus confirming the original description of Harris. A remarkable feature (of this individual, at any rate) is its silence; during repeated observations the writer never heard it utter any sound, thus contrasting sharply with the savage alertness of the Tasmanian devil in an adjacent cage, ever ready, though sun-blinded, to bite and to utter its ferocious sobbing growl. The keeper, however, stated that the thylacine would hiss or grunt if disturbed.

In view of the fast-increasing rarity of the marsupial wolf, it is interesting to remember that thylacines are bred in one of the Australian zoological gardens: this will perhaps by the foundation of a menagerie race stave off the day when it shall have vanished for ever. Specimens were exhibited in the Adelaide collection during 1900-01, and at Melbourne in 1900-02: perhaps some of the Australian stock was sold in Europe, for the collections at Berlin and in the New York Zoological Park have recently contained specimens—both of them young animals, apparently. These youngsters are amusingly like puppies; the New York animal is seen standing to be photographed in the most approved “good dog” style, though doubtless any sheep left to his mercies would be very effectually shepherded, once and for all.

The *future* of the thylacine, owing to its destructiveness, points to eventual extermination. Means were found to add to the specimen which died at Melbourne in 1900 further specimens obtained in the same year: and although another died during the following twelvemonth two more were purchased as late as 1902. Thus it seems at present possible to promptly replace any dead specimens in local (Australasian) collections. *Carpe diem.* Either certain of the wilder districts yet unappropriated by man should be set aside by Government as animal reserves, within which all shooting should be absolutely forbidden; or private individuals should undertake that less satisfactory method of preservation—the foundation of a menagerie stock on a line with the Père David's deer, an all but extinct Chinese species maintained on a private estate in England. It must be remembered that as late as 1893 much of the central table-land of Tasmania was uninhabited and even unexplored; a preserved tract of forest and waterfall, snow-capped mountains and ferny covert would surely constitute an ideal sanctuary for the thylacine. This natural retreat would be far more satisfactory (save perhaps to the stock farmer) than an artificial one; menagerie races are apt to deteriorate for lack of new blood, and dwindling gradually in stamina eventually exhibit that fatal sign—undue preponderance of male offspring in the litters. On the other hand, it

might be difficult to prevent the protected thylacines from ravaging the sheep farms as of old. In this connection one recollects the case of the protected hippopotami in Natal, which, in spite of long-continued and enlightened efforts for their preservation, had to be destroyed on account of their repeated inroads on the crops of neighbouring farmers. Besides, to fence in the tiger wolf reserve would incur expense of considerable proportions. *Per contra*, one remembers that Revolution Island has recently been set aside as a New Zealand bird refuge ; similarly a few thylacines might be trapped and turned out on some uninhabited island to "mind themselves" in a natural sanctuary. Truly the future of the thylacine—if it is to have any—hangs in the balance, and may fulfil the prophesy made by an experienced naturalist to the present writer—"I have seen one and shall never see another." *Absit omen!*



ECHIDNA.

Note the bird-like beak, the spiny covering extending all over the back and sides, and the long spur on the hind foot.
May, 1905.

THE TRUE ECHIDNA.

The whole of the animals hitherto considered in this work and also in its predecessor, although exhibiting the utmost variety of external appearance and internal structure, are nevertheless all rateable as typical examples of the class mammalia. Even the marsupials, such as the thylacine, are associated with their more orthodox brethren by many naturalists, who in this respect oppose the tripartite classification of Professor Huxley. Far different is it with the lowly monotremes (the ornithorynchus, the echidna, and the proechidnas); these are not only hatched from *eggs* laid by the mother, but also in their simple brains and in their skeleton exhibit many signs of affinity with the reptilian ancestors from which all mammals are sprung.

The true echidna or spiny anteater (*Echidna aculeata*)—canara of the Burnett River natives—measures from fourteen to nineteen inches in total length. Its figure is squat and flattened above, the burly outlines indicating considerable muscular power. The head is small and rounded like that of a bird, while the maxillæ are prolonged into a beak far more ornithic than that of the great anteater already described. The nostrils are small, situated in apteryx fashion at the end of the snout, and surrounded

during life with a bluish skin. The tongue is long, flexible, and *red* (not purple as in the great anteater): the salivary glands are immensely developed. The eyes are small, with a pale blue iris; the ears in a specimen now before me are without an external conch, and the aural aperture is hidden by a spiny *chevaux de frise*. The whole of the upper part of the body, indeed, bristles with a panoply of short quills which extends well down the sides: the tail is practically a burr armed with very convincing thorns. The under parts are clothed with thick, coarse hair: the forelegs are much bowed in front, and the hind ones in male subjects carry a short spur on the heel. The claws are powerful, broad, and flat. In the true echidna they are five in number and form a very effective natural rake. In colour this animal is of a general blackish brown hue; the spines being yellowish at their bases, and black at the tips, thus somewhat recalling (save for their shortness) those of porcupines. The coarse fur of the under surface is blackish brown.

The echidna inhabits Tasmania, Australia and New Guinea. Attempts have been made to separate various sub-species according to the amount of admixture of hair with the spines. Thus the Tasmanian race (the largest) is darker than the others, owing to the furry coat which, doubtless developed by reason of its more southern habitat, almost swamps the scanty spines. The Aus-

tralian form is intermediate, both in size and geographical range, and has very long spines; while the Port Moresby (New Guinea) race is the smallest, and the spines are very short. More extended study has shown, however, that all grades between the extreme forms can be obtained; hence the common echidna is allowed to rank as a single though varying and widely distributed species. Indeed, there is but one species of true echidna; the closely similar proechidnas of New Guinea have, as a rule, but three toes on each foot, and the beak is strongly curved downwards.

Crepuscular and also nocturnal in habits, the true echidna is a native of the scrub country, wandering at sundown through the yellowing thickets of dwarf acacia, and climbing over the rocky slopes with remarkable ease. Save for the snuffling sound with which they accompany their industrious search for food, echidnas are silent animals; this peculiarity, conjoined with the denseness of the scrub jungle, makes them difficult to find unless tracked by the eager aid of native dogs. In any case, it has been observed that for some unknown reason the females are always rarer than males. Menagerie specimens, according to the writer's observations, seem to be active at all times; wild echidna, however, do not move until about two hours before sundown, when they begin to hunt for prey with a marked intelligence and systematic pertinacity hardly to be expected of such lowly-

organised mammals. They feed particularly on termites and sugar-ants, and also turn various other insects out of the ground by rooting with their blunt snouts. Fallen trees are carefully inspected and the rotten wood torn away for the sake of the beetles concealed within; ant-hills are wrecked and most minutely worked through, the echidna methodically grubbing for hours amid the ruins, and sweeping up the luckless ants with its six-inch tongue. A remarkable circumstance doubtless assists the echidna in retaining its insect prey : for both tongue and palate are beset with minute spines recalling those which the writer in 1902 observed on the palate of the lesser bird of Paradise¹. These anteaters also explore the roots of saplings with their claws ; doubtless little in the insect line comes amiss to such practical entomologists. It is difficult to account for the presence of the sand which, as in the white whale, occurs in the stomach. Perhaps, however, small particles swept in with the ants accumulate in the echidna's interior ; yet if such be the case one would certainly expect the very peristaltic action of the stomach itself to effectually remove in a few hours at most all trace of such involuntary ballast. One wonders whether the echidna *intentionally* swallows the sand, just as insect-eating and other birds peck at gravel to aid

¹ Renshaw ; "The Lesser Bird of Paradise"—*Avicultural Magazine*, 1903.

digestion? Echidnas drink freely; they bask in the sun like armadillos and often, like them, dig their own burrows. The writer once saw a captive specimen run like a rabbit when startled. A well-known locality for these curious anteaters is the Blue Mountains near Sydney, where it is said specimens can readily be obtained by hunting with terriers. The Blue Mountains consist of a range of horizontally stratified sandstone about 2,500 feet high, intersected with deep gullies and chasms; a picture of this home of the echidna now before me, printed on the inevitable "picture post card," shows a fine panorama of Australian scenery, rugged yet beautiful, and picturesque in the extreme. Although when awake these animals are quick of hearing, during the Australian summer they became drowsy and dormant, and being comfortably loaded with fat pass into a state of aestivation or summer sleep corresponding to the *hibernation* of animals in northern latitudes. Like many other lowly-organised forms, echidna are very tenacious of life, and will recover completely from severe injuries. According to Vogt, the Geneva Museum contains an interesting specimen, being the skeleton of an echidna which during life had had no less than *eight* ribs on one side fractured by a sharp instrument: yet the broken surfaces had united perfectly, a result hardly to be expected in an animal.

The spur on the heel of the echidnas is probably

used in fights amongst themselves at the breeding season. It communicates with a gland which may secrete a poison; at any rate it was on account of this apparatus that the old naturalists conferred the name of *Echidna* on the species, likening it to the lethal machinery of the reptilian echidna ("Ἐχιδνα") or viper. M. M. Quoy and Gaimard were, however, unable to induce their own echidna to wound them with its spur, although they irritated it specially for this purpose. The *eggs* of these animals are of the size of that of a sparrow: resemble those of reptiles and not of birds, being cased in a leathery white shell like a snake's; and possess a relatively large yolk. The "new laid egg" is about five-eighths of an inch long and contains an embryo of one-fifth of an inch: it is transferred by the mother to the "brood pouch," a remarkable structure specially developed at the breeding season by the coalescence of two rudimentary folds of skin. The embryo soon breaks the shell with its specially armed beak, "tip-tilted like the petal of a flower,"¹ though it remains in the pouch till about three and a half inches long, at which period the spines begin to appear. Females may be taken with eggs or newly-hatched young in the pouch during the month of September; by the middle of October these quaint infants may be found in depressions of the

¹ The egg-breaking tubercle of the echidna may be compared with that of crocodiles and lizards.



DINGO.

These curious dogs are now frequently offered for sale in England, and make interesting pets.

ground—improvised nurseries excavated by the mother when she goes out to seek her own food.

Echidnas being at certain seasons of the year very fat, are in native eyes most desirable additions to the *menu* of the bush, being said to taste like sucking pig. The blacks hunt them by means of tame dingoes (see illustration) or with mongrel half breeds between the dingo and domestic dog. The half breeds are but curs, quarrelsome and annoying, though sharp enough at following an echidna track through the maze of acacia scrub. The dingo proper is almost a handsome animal, exhibiting much individual variation in colour, the tones ranging from red to black. The Australians take the dingo puppies from their holes (in hollow trees) and rear them in their huts. Naturally the dingo is as wild as a wolf, and as savage and bloodthirsty ; Australian stock-raisers have suffered from it losses almost, if not quite, as great as those which the Tasmanians have experienced from the thylacine. However, being reared up from puppyhood by their black masters, the young dingoes grow up tame, though never completely domesticated.

The "porcupine anteater" was first described in 1792 by Dr. Shaw in the "Naturalists' Miscellany," though he confused the echidna with the American anteaters, styling it the *Myrmecophaga aculeata*; the type specimen is no longer in existence. The French surgeon-naturalists, M. M. Quoy and Gaimard,

obtained during their long voyage a live echidna, above-mentioned. Apathetic and perhaps in a state of semi-æstivation (or sea-sick!) it refused food for a month; at last, they induced it to eat a dubious mixture of sugared flour moistened with water. One fears that the poor echidna was not long for this world! Lieutenant Breton once took a live specimen in that echidna metropolis—the Blue Mountains—and managed to feed it on scientific lines. Having given it ants' eggs mixed with milk while on shore, when the ship sailed he succeeded in getting it to take a mixed diet of egg, liver, and chopped meat—a routine *menu* hardly to be improved on at the present day, even in the best zoological gardens. The Lieutenant was hoping to bring his pet safely home, but unfortunately the eggs on which he conscientiously fed it being very bad, the animal died suddenly off Cape Horn. Dr. Gray's catalogue of the mammals in the British Museum, published in 1843, contains an entry of an echidna "presented by Lieutenant Breton"; no doubt this was the same specimen which, though dead, its owner determined should not be wasted. The Lieutenant wrote to the Zoological Society, and in his letter, read at a meeting on March 25, 1834, gave some sensible instructions to any desirous of bringing over a live echidna. This interesting event occurred in 1846, when the first living example ever seen in England was received at the Zoological

Gardens. Mr. Waterhouse records that it rejected the mealworms so readily eaten by many mammals. Now even lemurs and *squirrels* to the writer's certain knowledge will eat these ; an echidna which at home *lives* on insect diet surely acted strangely in refusing such fare.

A male echidna from Queensland was acquired in 1898 by the Amsterdam Zoological Society, and has been carefully studied by the present writer. Asleep during the forenoon, this animal resisted all the keeper's efforts to dislodge him from his corner, holding on with great tenacity to the angles of the cage. Even leverage with a stout pole entirely failed to move the echidna.¹ These animals are said to be able unaided to move a weight of 30lbs; and after this practical demonstration of its power of muscle one could well believe it. When asleep the spines of each side converge towards the middle line of the back, thus suggesting some large thorny fruit. Echidnas, like armadillos, have a curious trick of shivering, even in warm weather, when asleep. On the writer's second visit in 1902 the keeper succeeded in rousing it for a few minutes, when the animal waddled for a short distance on its short stumpy legs and then rolled itself up again. It was active in the late afternoon—half-past five—toddling about the cage with a curious, swaying,

¹ Mr. C. Bennett mentions a captive echidna that used to wedge itself almost immovably at the bottom of a cask.

top-heavy gait. Like the great anteater already described, this monotreme anteater recalled several animals in one. Its bowed legs and padding gait reminded one of a bear; when standing still it often raised itself high on its legs, the arched back and long beak then absurdly suggesting a spiny elephant. The echidna shivers and puffs like an armadillo and like it examines every crevice of its cage with great minuteness, at once attacking any weak spot. It differs from that animal, however, in using *one forepaw only* to prise open a crevice, standing on the other meanwhile. The flexibility of the echidna's clumsy wrist is quite surprising; more to be expected is the sinuosity of its long tongue, which can be protruded a clear three inches from the mouth and is freely used for exploring crevices. The Amsterdam specimen lived at least four years in the collection, thriving on a mixture of beef, eggs, and milk. The writer observed another echidna at Rotterdam, rolled up asleep. These animals are often kept in the Australian zoological gardens, being fed on bread and milk and finely chopped eggs. As illustrating the abundance of the spiny anteater in its own country, it may be mentioned that a specimen was presented to the Adelaide collection in July, 1899, a second in the following August, a third in May, 1900, a fourth in September, 1900, and a fifth in November of the last-named year. At Melbourne similarly an

echidna was presented to the collection in 1900, two others in 1901, and *three* others in 1902. This abundance of material contrasts sharply with the rarity of the animal in European vivaria. Echidnas not only become tame, but will even allow themselves to be carried about. From their thorny panoply, however, they are rather undesirable burdens.

And so is written the description, manners, and history of the quaint echidna, the most remarkable product of that most remarkable land of topsyturvydom—Australia. Fitly indeed does it inhabit the continent which produces a stingless bee, a mammal with a duck's bill, and a mole with the pouch of a dasyure; where the kingfishers live on rats and lizards; where the "bush pheasants" are cuckoos, and where the boobook owl conversely mimics the harbinger of Spring. A host of strange animals from the tarsier downwards have been treated of in these pages—bat and hunting-dog, antelope and tapir, squirrel and thylacine. Each and all have their special interest, their external characters, even their mental attributes, feeble though they be in some: the studies which this final Essay terminates will, it is hoped, stimulate and enlarge the reader's interest in the vast field of Nature which lies all about him. *Finis coronat opus.* It but remains to borrow some fitting term of farewell salutation.

To all unto whom these presents shall come, greeting.

Demy 8vo.
220 pages
37 Illustrations.

Price 6s. net.
Postage 5d.

BY THE SAME AUTHOR

Natural History Essays

Press Notices.

The mere tyro in natural history, as well as the professed student, will find much to interest him in Dr. Renshaw's essays. The book, which is illustrated with photographs, is published at the price of 6s. net.—‘Manchester Evening News.’

A very interesting six-shilling volume of ‘Natural History Essays,’ in which he deals chiefly with typical examples of the mammalian fauna of Africa. His chapters on disappearing or rare types are packed with curious information, and he provides some facts which, to us at all events, are decidedly new.—‘Manchester Evening Chronicle.’

Most readers of ‘The Zoologist’ are familiar with the name of Dr. Renshaw, who has contributed several papers on rare mammals and birds to its pages.—‘The Zoologist.’

The compilation of this interesting volume is a sequel to a series of lectures and magazine articles by Dr. Renshaw on typical ex-

amples of the mammalian fauna of Africa. The author is himself an expert zoologist, who has travelled far, and observed much regarding the habits of wild animals. His book, however, although it will appeal strongly to the naturalist, is by no means addressed merely to the scientific man. Its simple language and popular treatment make it welcome to the general reader, while all lovers of animals will find it full of instruction. One of the pieces of information which the author gives in an early part of the work is that the compilers of the older natural histories were rather careless and misleading in their statements respecting the 'savage' and 'untameable' nature of many wild animals.—'Chester Courant.'

In this book (which is fully illustrated by photographs) 'an attempt has been made to describe typical examples of the mammalian fauna of Africa as seen both from the zoological and the historical standpoint.'—'The Times.'

Mr. Graham Renshaw, who is known as an informing lecturer and writer on natural history, has, by the publication of a series of essays on that subject, produced a volume which will doubtless prove of great interest to many. . . . The style of the essays is popular, so that even the general reader cannot fail to be interested in matters which might be supposed to appeal only to experts. The illustrations, although they are on a small scale, enhance the value of the book.—'Scotsman.'

The book will be of great service to teachers who have no time to work the subject out at first hand, and, at the same time, it will be a capital handbook for any visitor to the Zoological Gardens who wishes to take more than a superficial interest in the curious creatures to be found there. The illustrations from photographs of many animals not to be found in ordinary collections greatly add to the value of the book, since they enable the reader better to understand the relationships and types of those with which he is more or less familiar. The book is an excellent example of the modern method of popularising science.—'Manchester Courier.'

The short articles contained in this volume treat of various animals which are found in Africa, a continent that has been opened out so extensively within recent years, revealing many strange and interesting forms of animal life. Dr. Renshaw has evidently travelled in some of the remoter regions of Africa, where he has been able to study the fauna, so that his remarks about the life

and habits of the animals are in many cases the result of observation, whilst in others he has quite obviously gained his information from museums and menageries.—‘*Sheffield Daily Telegraph*.’

Mr. Renshaw, whose lectures and magazine articles are well known, has published an interesting book that fills a gap, and that will be of use both to the student and to the reader who takes a general interest in zoological matters. . . . The illustrations are helpful, and stimulate the imagination to sympathise with the ability and enthusiasm Mr. Renshaw has brought to bear on a subject of real, if not of common, interest.—‘*Leeds and Yorkshire Post*.’

Needless to say, the book is a popular one, and Mr. Renshaw has managed to hit off the happy mean of information, not too much nor too little, but just sufficient for the needs or the amusement of the ordinary reader. And to complete the circle of attraction, a series of beautiful photographic reproductions are included, in number far greater than one is generally accustomed to; one illustration at least is given in every case, but two, and more often than not two or three, accompany any given description. Mr. Renshaw has presented his studies in the most attractive guise possible, and we trust that the many lovers of animals in this country will not be deterred from a consideration of his book just because it breaks ground in less familiar subjects than horses, dogs, or game birds.—‘*Glasgow Herald*.’

The handsome volume is of considerable value to young naturalists.—‘*Liverpool Daily Post*.’

Mr. Renshaw appears to have been well advised in re-issuing in book form the sixteen articles and lectures which constitute the volume before us, since several of them contain much important information with regard to species now verging on extinction, or which have been already exterminated, while all are eminently readjustable and full of interest. Whether the author has quite done himself justice in the title he has chosen for his work may be open to question, seeing that all the articles relate to a single subject, namely, the mammals of Africa. Undoubtedly the most generally interesting and important articles of the series are the two dealing with the quagga and the blaauwbok, next to which may perhaps be ranked those on the white rhinoceros, the pigmy

hippopotamus, and the giraffe. The book is abundantly illustrated with reproductions from photographs, many of which, like the one here shown, are excellent examples of animal photography.—‘Nature.’

Mr. Renshaw, whose lectures and magazine articles are well known, has published an interesting book that fills a gap, and that will be of use both to the student and to the reader who takes a general interest in zoological matters. Mr. Renshaw gives us careful descriptions of typical examples of the mammalian fauna of Africa, both from the zoological and the historical point of view. His work is the result of several years’ investigation, and we feel that every word has been well weighed, and that the information is reliable.—‘Leeds Mercury.’

Dr. Renshaw, in a modest preface, frankly acknowledges that the kind reception accorded to certain lectures and magazine articles has encouraged him in the preparation of this little work. In it, he says, an attempt has been made to describe typical examples of the mammalian fauna of Africa as seen both from the zoological and the historical standpoint. We are further told that the information upon which this book is based is the outcome of several years’ investigation, research and correspondence. There is certainly much in the book which amply corroborates that statement. Natural history has been rather heavily run upon of late, and—alas—too often writers with but a superficial acquaintance with the subject have rushed into print with their observations and impressions. That kind of thing is easily done, though it is scarcely worth doing. But when a man with scientific knowledge devotes himself to the study of the subject, and after due reflection commits his thoughts to paper, the result, as in the case of the book before us, is alike interesting and instructive.—‘Birmingham Post.’

We have read the book with interest.—‘Spectator.’

The essays, which are sixteen in number, are brightly written in a popular style. Each one has a good photograph as illustration. Several years’ research and correspondence have gone to the making of the book, and the lover of wild things will find much to interest him in it.—‘Manchester City News.’

Renshaw, Grah

APR 16 1940

APR 16 1968

59.9:08 General

AMNH LIBRARY



100060597